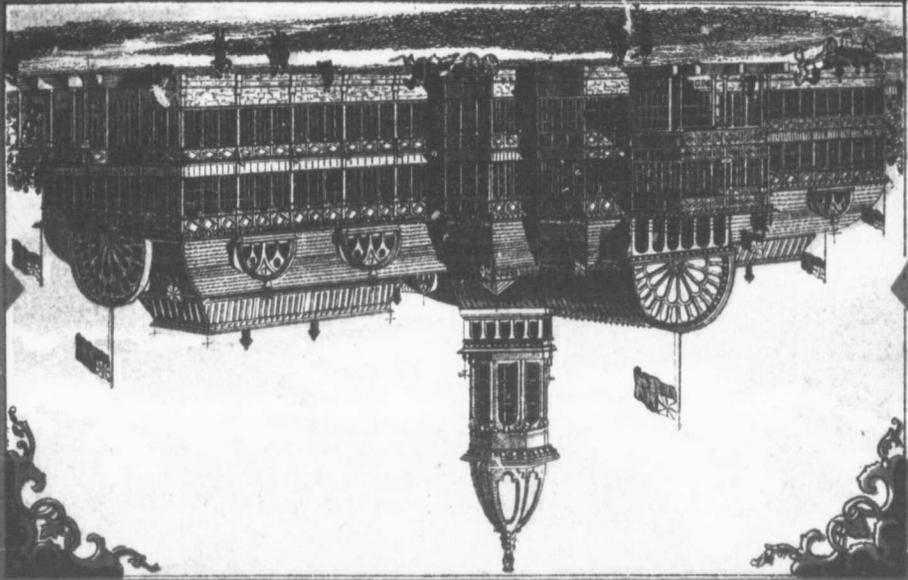


General Printing & Publishing Co. Toronto, Ont. PRICE 40 CENTS

THE WEEKLY MAIL

PUBLISHED IN CONNECTION WITH

PROVINCIAL EXHIBITION, TORONTO
MAIN BUILDING



FOR 1879

CANADIAN FARM ANNUAL

THE

W. Lecky 1879

THE WEEKLY MAIL will be sent to any Post Office in Canada or the United States, or to any address in England, Ireland, or Scotland, postage prepaid for \$1.50 Per Annum, or THE DAILY MAIL for \$6 Per Annum.

THE CANADIAN FARM ANNUAL

is presented to every yearly subscriber to THE WEEKLY MAIL.

ADDRESS "THE MAIL," TORONTO, CANADA.

THE WEEKLY MAIL FOR 1879.

It is nearly seven years since THE MAIL was established, and during that time it has gradually acquired circulation and influence, which renders it second to no other newspaper in the Dominion. The Publisher takes pleasure in announcing that THE WEEKLY MAIL has met with a very large measure of success in the year just closed, and that notwithstanding the general depression in business, and the consequent falling off in the circulation of almost every other paper in Canada, THE MAIL both DAILY and WEEKLY has made a very great advance.

The improvements begun in THE WEEKLY MAIL during 1878 will be continued during this year.

Special Editors have been engaged for the various Departments, and no expense will be spared to make the whole paper

INTERESTING AND RELIABLE.

THE MAIL will remain true to the principles it has always advocated, and it is intended to make it, by the aid of such additional strength as ample capital can afford, even a more potent champion of the Conservative cause. All the old Departments of

**TELEGRAPHIC NEWS,
POLITICAL INTELLIGENCE,
AND EDITORIALS,
WILL BE CONTINUED WITH UNABATED VIGOUR.**

During 1879 the following Departments will receive special attention :—

AGRICULTURE in its various branches. Special prominence being given to correspondence from Farmers on Agricultural Subjects. Illustrations will be used wherever they will make the subject clearer or in any way increase the practical value of the letter press.

OUR MARKET REPORTS will be a specialty; we will use every means to secure complete reliability. The Market Reports of THE MAIL are noted as the most reliable in Canada.

OUR LITERARY DEPARTMENT will be a leading feature. Stories both short and continued from the pens of the best authors, and in many cases illustrated.

THE LADIES' DEPARTMENT, under charge of Ladies of experience, will, we have no doubt, prove an interesting and valuable feature. Fashions, Household, Culinary Matters, the Care of Children, &c., will be included in this department.

HEALTH IN THE HOUSEHOLD, under charge of an able medical man, will add to the value of *The Weekly Mail*.

THE WEEKLY MAIL

is published every Thursday morning, and reaches every Post Office in Ontario and Quebec before Saturday night. Circulating as it does among the very best Farmers and Merchants in country places, it cannot be excelled as a medium for various classes of advertising. The rate of ordinary Advertising is 15 cents per line of solid Nonpariel. Notices among Reading Matter, 30 cents per line.

Advertisements occupying less than 10 line space are charged as 10 line Advertisements.

Contracts are made for definite spaces of time (payable quarterly in advance) at the following

CONTRACT RATES PER LINE :—If inserted every week, 1 year, \$5.50 6 months, \$3.00 3 months, \$1.75
" " " every second week, " 3.00 " 1.75

Contracts for Notices in Reading Matter, double the above rates.

Condensed Advertisements on Last Page.—Twenty words or less, 50 cents each insertion; each additional word, 2 cents.

Contracts will be made for condensed Advertisements at the following rates for twenty words :—Inserted every issue, 1 year, \$20; 6 months, \$12.

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CHINA HALL,

(SIGN OF THE BIG JUG, REGISTERED.)

GLOVER HARRISON,

IMPORTER OF

China, Glass, and Earthenware,

Russian White Wheat.

I have tested the Russian White Wheat three years. In 1876 I imported 100 lbs.; I sowed it May 27th: I sowed Fife the same time; I thrashed 23 bush. per acre of Russian; 13 bush. per acre of Fife. The Fife was badly rusted, but there was no rust on the Russian, and it was a week earlier than the Fife. In 1877 I sowed Russian and Fife; I thrashed 32 bush. per acre of Russian, and 17 of Fife, the Fife being rusted, and none on the Russian. In 1878 I sowed Russian, and had 27 bush. per acre; it stood up and was just as bright in straw as any fall wheat in the first of the season, when other spring wheat suffered from joint worm and blight, and was almost a failure,—JAMES TRAN.

Four oz. packages of the Russian White Wheat sent to any address, postage pre-paid, on receipt of 25 cents to pay for postage and packing.

Address,

THOMAS FENWICK,

Box 35, TORONTO.

Super Phosphate of Lime,	- - - - -	300.00	per ton.
Fine Bone Dust,	- - - - -	30.00	" "
1-2 Inch Bone Dust,	- - - - -	25.00	" "
3-4 Inch Bone Dust,	- - - - -	20.00	" "

F.O.B. Toronto. Send for Circular.

PETER R. LAMB & CO., TORONTO.

NOAH L. PIPER & SON,

169 Yonge Street & 3 and 5 Queen Street East.

THE HEADQUARTERS,

Have always on hand the largest stock of

HOUSE FURNISHING GOODS, LAMPS, CHANDELIERS, STOVES, TINWARE
JAPANNED WARE, COAL OIL, &c., &c.

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ADDRESS "THE MAIL," TORONTO, CANADA.

THE WEEKLY MAIL

Russian White Wheat

I have tested the Russian White Wheat three years. In 1874 I sowed it in May 27th. I sowed it the same time I sowed 27 bush. of the best of the Russian, and it was a week earlier than the other. In 1875 I sowed Russian and the other. I sowed 27 bush. of the Russian, and 17 of the other. The first being the best, and none of the other. In 1876 I sowed Russian, and had 27 bush. per acre. It stood up and was just as bright in straw as any fall wheat in the first of the season when other wheat suffered from frost and light and was almost ruined. —James T. Cox

Four or five packages of the Russian White Wheat sent to my address, postage prepaid, on receipt of 25 cents to pay for postage and packing.

THOMAS BENWICK

OUR LITERARY DEPARTMENT is composed of the pens of the best authors, and in many cases illustrated.

THE LADIES' DEPARTMENT, under charge of Ladies of experience, will, we have no doubt, prove an interesting and valuable feature. Fashions, Household, Culinary Matters, the Care of Children, &c., will be included in this department.

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 " " every second week, " 3.00 " 1.75

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CHINA HALL,

(SIGN OF THE BIG JUG, REGISTERED.)

GLOVER HARRISON,

IMPORTER OF

China, Glass, and Earthenware,

Plated and Fancy Goods, Table Cutlery, Bust and Parian Marble Statuary,
Bohemian Vases, &c.

71 KING STREET EAST, TORONTO

STOVES.

ALL KINDS OF COOKING AND HEATING STOVES.

Send for prices and state what kind of stove wanted. Freight paid to your nearest railway station.
Prices guaranteed lower than any House in the Trade.

WHEELER & BAIN,

179 King Street East, and 278 Queen Street West, Toronto.

ESTABLISHED 1840.

PETER R. LAMB & CO.,

MANUFACTURERS OF

FERTILIZERS.

Super Phosphate of Lime,	- - - - -	\$30.00 Per Ton.
Fine Bone Dust,	- - - - -	30.00 " "
1-2 Inch Bone Dust,	- - - - -	25.00 " "
3-4 Inch Bone Dust,	- - - - -	20.00 " "

F.O.B. Toronto. Send for Circular.

PETER R. LAMB & CO., TORONTO.

NOAH L. PIPER & SON,

169 Yonge Street & 3 and 5 Queen Street East.

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Have always on hand the largest stock of

HOUSE FURNISHING GOODS, LAMPS, CHANDELIERS, STOVES, TINWARE
JAPANNED WARE, COAL OIL, &c., &c.

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\$1.50

W. J. WHITTEN & CO.,

173 KING STREET EAST, TORONTO,

DEALER IN

STOVES, LAMPS, COAL OIL,

And all kinds of House Furnishing Goods, and Manufacturers of Tinware, Wholesale and Retail.

BROWN BROTHERS,

Wholesale Stationers,

ACCOUNT BOOK MANUFACTURERS,

BOOKBINDERS, &c.,

66 AND 68 KING STREET EAST, TORONTO.

SPECIALTIES !!

Paper, Envelopes, and General Stationery.

ACCOUNT BOOKS.—Our own make cannot be surpassed.

Wallets, Pocket Books, Banker's Cases, &c.

DIARIES, Office and Pocket—Over 100 varieties.

BOOKBINDING—Noted for style, strength, and cheapness.

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NATIONAL PUMP WORKS.

J. A. McMARTIN & CO.,

Sole Manufacturers of the McMartin Double and Single Acting Force and Lift Pumps; also, Hand Power Fire Engines, with Hose Reels combined. First and Extra Prizes awarded at the Provincial Exhibitions held at Quebec, London, Toronto, Hamilton, and Brantford. Diploma at Quebec, pending at Hamilton, Toronto, and Brantford, for our Patent Pumps for ships, barges, railways, factories, wells, cisterns, and self-ventilating base, being anti freezing. Description catalogues can be had on application at the

WORKS—637 CRAIG STREET,

OR P. O. BOX 1212,

MONTREAL.

Both Square a
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FOR FIVE Y:
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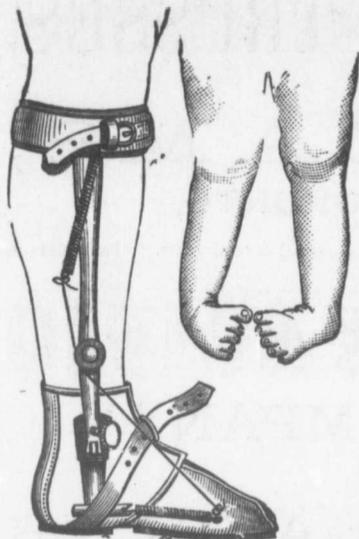
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catalogues can be had on

AIG STREET,

IX 1212,

REAL.



JAMES AUTHORS,

MANUFACTURER OF

Artificial I' Surgical Appli-
ances, Spin: pports, Instruments
for p Disease, Bow Legs, Knock
Knees, Club Foot, &c.

TRUSSES MADE TO ORDER.

TESTIMONIAL.

Mr. Authors has frequently constructed orthopedic appliances for patients of mine. Surgeons will, I believe, have every satisfaction in securing his aid in this line.

W. T. AIKIN, M.D.,
Surgeon to Toronto General Hospital, Lecturer on Surgery, &c.

M. H. HIRSCHBERG
84 York Street, Toronto, Ontario,
DEALER IN PIANOS AND ORGANS.



THE "GALAXY PIANOS,"

Both Square and Upright, are acknowledged by professionals of highest standing to be magnificent instruments in regard to durability and workmanship, as well as sweetness, power of tone, and elegance of design. They give universal satisfaction to all who have purchased them, and are fully GUARANTEED FOR FIVE YEARS. The \$250 GALAXY PIANO is at least equal, if not superior, to those sold elsewhere for \$400.

WILCOX & WHITE ORGANS.

I sell these magnificent instruments with a discount of 30 per cent. off Catalogue prices, which is less than heretofore charged to dealers. Catalogues sent free on application, and country orders promptly attended to.

M. H. HIRSCHBERG
84 YORK STREET, TORONTO.

THEY
Sta
\$1.50

RADICAL CURE TRUSSES.

—o—
DR. J. ADAMS,
58 BAY STREET, TORONTO,

References to persons who have been cured after having been ruptured several years. "Pamphlet on Rupture" free.

THE UNION PACIFIC RAILROAD COMPANY

HAS FOR SALE

12,000,000 ACRES

Of the Best Land in the World, \$3 to \$8 Per Acre.

Ten years' credit, 6 per cent interest. These lands are situate in Central Nebraska, the Garden of the West, in the best location for health. No fever and ague, so prevalent in other Western States. Near the best markets east or west, on the line of the

Only Railroad Across the Continent

Near growing towns, good schools, churches, stores, and all the comforts of life; labour plenty, and good prices paid; well watered by pure streams; timber grows along the streams, and is easily cultivated. Fuel cheap; free transportation over the Union Pacific Railroad to land buyers; within forty-eight hours ride (all rail route) of Toronto.

Papers, maps, guides, Pamphlets, and general information sent free. Address

LEAVITT BURNHAM,

Land Commissioner, U. P. Railway, Omaha, Nebraska,

Or, **SAM. BEATTY,**

General Agent Land Department U. P. Ry., Rossin House Block, York St., Toronto.

WESTERN CANADA LOAN & SAVINGS COMPANY.

OFFICES—NO. 70 CHURCH STREET, TORONTO.

Capital, \$1,000,000. Total Assets, \$3,000,000. Reserve Fund, \$360,000.

President—HON. G. W. ALLAN, Senator; Vice-President—GEORGE GOODERHAM.

Directors—WM. GOODERHAM, SAML. PLATT, T. H. LEE, GEO. W. LEWIS, HON. D. L. MACPHERSON, Senator

SAVINGS BANK BRANCH.

Money received on deposit, and interest allowed, compounded half-yearly.

The whole Assets of the Company are invested on the Security of Real Estate and Municipal Debentures, thereby giving the Depositors undoubted Security for all the money left with this Company.

MONEY TO LOAN.—This Company advances Money on the Security of improved City or Farm Property, repayable by means of a Sinking Fund, which is found to be the surest and easiest mode of repaying a loan.

See our reduced Loan Table. For further information apply at the offices of the Company.

WALTER S. LEE, Manager.

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OODERHAM.

MACPHERSON, Senator

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Municipal Debentures,
Company.

City or Farm Property,
mode of repaying a loan.

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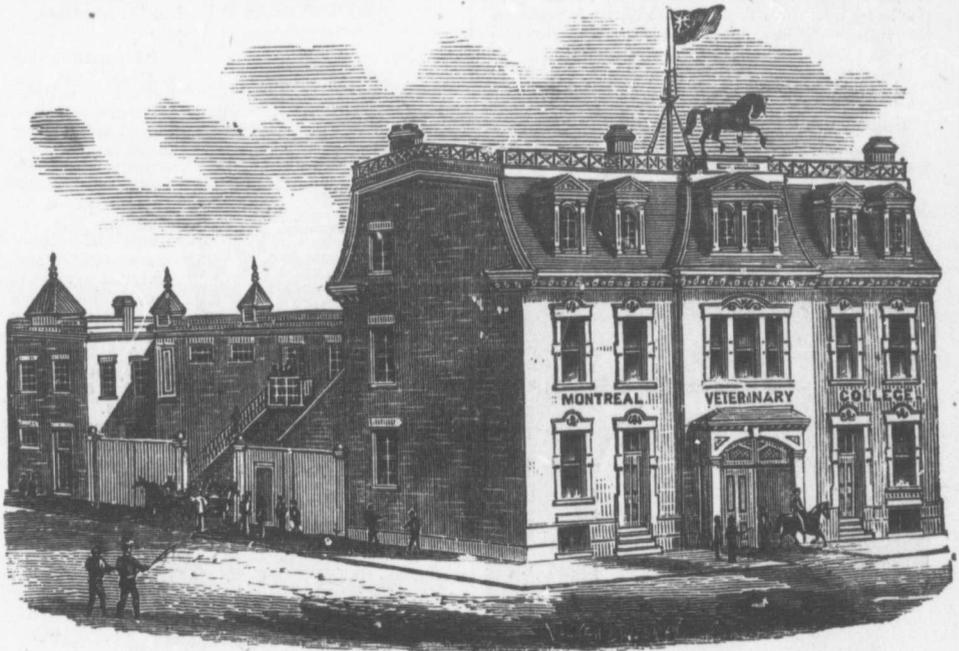
THE BRITISH AMERICAN BUSINESS COLLEGE, 112 and 114 King Street West, Toronto,

Offers to young men and women unsurpassed facilities for acquiring a thorough business education. The principal branches taught are

Book-keeping, Double and Single Entry, Arithmetic, Penmanship, Commercial Law, Correspondence, Practical Grammar, Business Forms, Rapid Calculations, Spelling, &c.

Individual Instruction. Careful attention to attendance and progress of pupils. Students may enter at any time. The public are cordially invited to call and thoroughly examine the rooms, course of instruction, and the working of the actual business department. Circulars free.

J. D. ODELL, PRINCIPAL.



MONTREAL VETERINARY COLLEGE.

Established - - - - 1866.

In connection with the Medical Faculty of McGill University.

<i>Professors.</i>	<i>Subjects</i>
J. W. DAWSON, LL.D.....	Botany.
R. CRAIK, M.D.....	Chemistry.
WM. OSLER, M.D., F.R.C.P.....	Physiology.
do do	Entozoa.
JAMES BELL, M.D.....	Veterinary Materia Medica.
C. C. SYFORD, V.S.....	Veterinary Anatomy.
D. McEACHRAN, F.R.C.V.S.....	Veterinary Medicine and Surgery
O. BRUNEAU, V.S.....	Clinical Assistant.

Lectures commence in the beginning of October in each year.

Prospectuses, giving intending students full information as to the course, cost, text books, &c., sent free on application to

D. McEachran, F.R.C.V.S., Principal, Montreal.

THE
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\$1.50

CANADA TRUSS FACTORY,

688 and 690 Craig Street,
MONTREAL.

ESTABLISHED 1856.

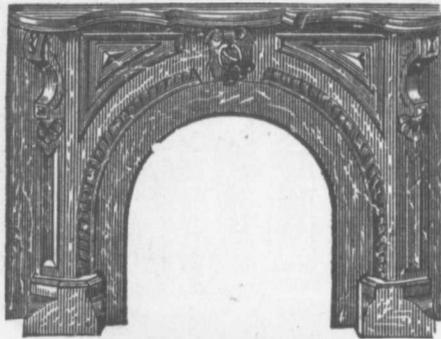
F. GROSS,

Surgical Instrument Maker,

Inventor and Manufacturer of all kinds of Instruments for Physical Deformities, Gross' Patent Composite Radical Cure Truss, Abdominal Supporters, and Improved Chest Expanding Steel Back Shoulder Braces.

Gross' Patent Artificial Limbs.
Gross' Improved Rheumatic Chains and Belts.
Rubber Goods of every description.
Catalogues containing full descriptions sent Post free.

All necessary repairs to any of the above articles done with neatness and at moderate charges.
Improved Self-acting Cow Milkers for sale.



R. HANGER,

102 and 104 York Street, Hamilton, Ontario,
Manufacturer and Dealer in

MARBLEIZED SLATE MANTELS.

Marble Mantels and Grates constantly on hand.
First prize awarded at the late Provincial and Central Fairs. Send for circular and price list.

VISITORS

-TO-

HAMILTON

will find the

DOMINION HOTEL.

the most comfortable, private and commercial hotel in the city.

Terms—\$1.00 Per Day.

Special rates for boarders remaining over a week. Large Sample Rooms attached.

King Street West, opposite Charles Street.

HENRY McKILLIP, Proprietor.

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J. N. ANDERSON, M. D.,



gives exclusive attention to
the treatment of the various

Diseases of the Eye
and Ear.

Cross Eyes Straightened.

TESTIMONIAL.

Having consulted Dr. Anderson, of Hamilton, in his professional character as an ophthalmist, I have every reason to be perfectly satisfied with the accuracy of his opinion and the skill manifested in my case. I can confidently commend him to the confidence of all such as may require his advice as a painstaking and conscientious practitioner, whose skill must ensure success.

GEO. DOUGLAS, D.D., L.L.D., Montreal.



Information for ruptured and deformed people. Charles Cluthe's Patent Spiral Truss is the best known remedy for all kinds of hernia. It is no quack invention, but the result of many years' study and material experience. This truss cured persons over 90 years of age. In children, otherwise healthy, it is a sure cure by 6 weeks.

Send for circular with 20 fine illustrations. See *Mail or Globe* for dates of established tour throughout the country. CHARLES CLUTHE, 99 King Street East, Hamilton.



DEVONSHIRE CATTLE FOOD

proves itself to be the best and most nutritious food for horses, cattle, pigs, and sheep, which will be seen by the large exportation of cattle to England. Book sent free. JOHN LUMBERS, Sole Manufacturer, 101 Adelaide Street East, Toronto.

BIG GIANT CORN MILL

EVERY MAN HIS OWN MILLER.



The only mill that will grind as fine as when new until worn entirely out. The only Mill grinding Corn and Cob successfully, that will grind Shelled Corn fine enough for family use.

Grinds twice as fast as any other Mill of same size and price. Manufactured by J. A. FIELD, SON & CO. Office and Sale Room, 7 Rebecca street (two doors east of James), Hamilton, Ontario, Canada. St. Louis, Mo., U. S. A.

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Information for
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Charles Cluthe's
Patent Spiral Truss
is the best known
remedy for all
kinds of hernia.
It is no quack in-
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result of many
years' study and
material experi-
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cured persons over
90 years of age. In
children, otherwise
healthy, it is a sure
cure by 6 weeks.
Illustrations. See
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CLUTHE, 99 King



TITLE FOOD

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rice. Manufactured
A. FIELD, SON &
Rebecca street (two-
n, Ontario, Canada.

THE JOSEPH HALL MANUFACTURING CO.,

OF OSHAWA, ONTARIO.

desire to call the attention of the agricultural public to their

Steam Engine Mounted on Wheels

For Threshing, Wood Saw-
ing, and other purposes.

It is simple in its construction, easily managed,
not liable to get out of order, made of the very best
material, and in workmanship unsurpassed. All its
working parts can be replaced by duplicates without
taking the engine to a machine shop.

It Consumes Less Wood & Water

than any other engine of its capacity manufactured
in Canada. There is absolutely

No Danger from Fire

with ordinary care.

One-Half More Threshing

can be done in a day

THAN BY TEN HORSES.

THE ENGINE

HAS BEEN

THOROUGHLY INTRODUCED.

THOUSANDS OF THEM

built upon the same model are now being

USED IN THE UNITED STATES,

and those of our own manufacture built last season

Give Entire Satisfaction.

OUR ENGINES CAN BE SEEN AT OUR

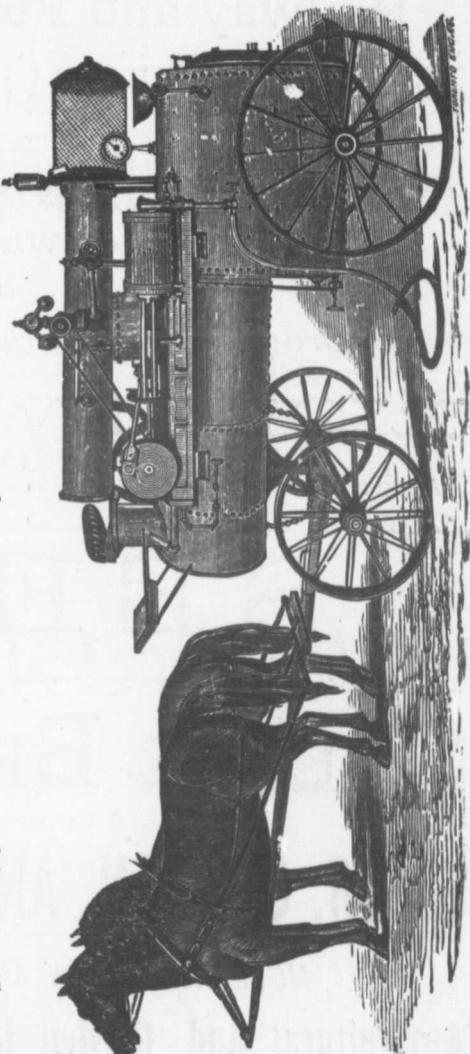
BRANCH WAREHOUSE AT LONDON

AND AT THE

WORKS, OSHAWA.

Address, R. DILLON, Agent, London.

Or, Joseph Hall Manufacturing Co., Oshawa.



THEY
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\$1.50

RICE LEWIS & SON, TORONTO, HARDWARE AND IRON MERCHANTS,

DEALERS IN

Railway and Foundry Supplies,
MACHINISTS' & CARPENTERS' TOOLS,
CUTLERY,
IRON AND WOOD WORKING MACHINERY,
Barbed Wire Fencing.

—o—
Orders by Mail Promptly Attended to. —o—

RICE LEWIS & SON, TORONTO.

ARTHUR B. LEE.

JOHN LEYS.

SEEDS.

STEELE BROS. & Co.,

DEALERS IN IMPORTED AND HOME-GROWN

FARM, GARDEN, AND FLOWER SEEDS,

HOLLAND BULBS AND FLOWER ROOTS,

Agricultural and Garden Implements, Fertilizers, &c.

ILLUSTRATED AND DESCRIPTIVE CATALOGUES issued January and September of every year, and mailed free to all applicants.

STEELE BROS & CO.,

89 Front Street East, Toronto, Ontario.

N. B.—Correspondence solicited from all who wish to buy or sell Choice Seeds or Seed Grain.

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THE CANADIAN

FARM ANNUAL

FOR 1879.



PUBLISHED IN CONNECTION WITH

THE WEEKLY MAIL.



TORONTO :

THE MAIL, CORNER OF KING AND BAY STREETS.
1879.

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upplies,

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ACHINERY,

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SON,

JOHN LEYS.

S.

& Co.,

ER SEEDS,

ROOTS,

Fertilizers, &c.

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THE NEW
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\$1.50

THE

The following articles which appeared during the past year in THE WEEKLY MAIL have been gathered into this Annual, in order that the more convenient form might make them more easy of reference, and thereby increase their value. The editor is especially indebted for information and engravings to *The Farmer's and Gardener's Almanac* and *The Annual Register of Rural Affairs*.

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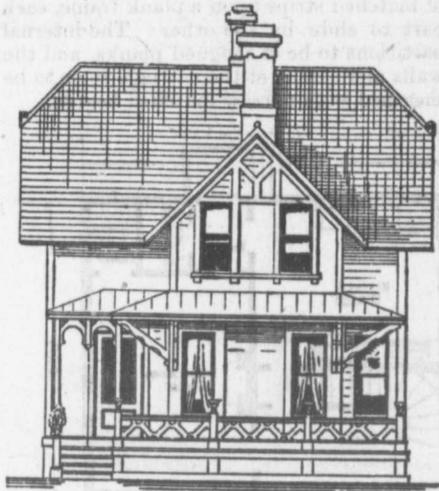
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DESIGNS FOR COTTAGE AND STABLE.

DESIGNS FOR COTTAGE AND STABLE.

THE cottage represented will probably cost about \$2,500, and the cost of the stable would not exceed \$500. The ground plan of the cottage shows a principal entrance, porch forming part of an extended verandah, but to a considerable extent distinct from the verandah. The porch finish consists of posts with some ornamental features, while the verandah has only an open balustrade and a roof supported by brackets. The hall communicates directly with the dining-room and with the parlour, each 11 by 16 feet, and by a way which is at once convenient and not too ready with the kitchen. This last has a range fire-place, the flue from which is carried over to the dining-room chimney above the second story ceiling, a sink, and three wash trays. For the kitchen a rear entrance is provided, serving also as a communicating passage with the dining-room, and with the kitchen closet. The second floor plan contains three good sized chambers, with a smaller bed-room and a bath-room located directly over that part of the kitchen which permits the pipes necessary for the bath-room and the kitchen range and sink to form one compact system. The heat from the range flue

the centre. The first floor is raised 3 feet above the grade of the ground, which is about the proper height for houses of this



FRONT.

class, requiring only five steps from the ground to the floor, and permitting the use of cellar windows large enough to light and ventilate the cellar thoroughly. It is almost a maxim among builders that there is always more risk of getting a house of this class too low than too high above the ground. Of course allowance should be made for a sufficient grade in the earth to turn the water away from the house in all directions; 1 foot in 10 feet is not too much to reckon upon.

The principal external features of this design are, besides the verandah and its bracketted roof, the truncated gables of the main portion and the finish connected with



SIDE.

would probably be sufficient in all ordinary weather to warm the bath room. The first story finishes 9 feet high, and the second 6 feet high at the eaves and 8 feet at

it. The central vertical piece, of which the bracket is a continuation, taken with the rest of the gable finish, is designed to harmonize with the larger and smaller

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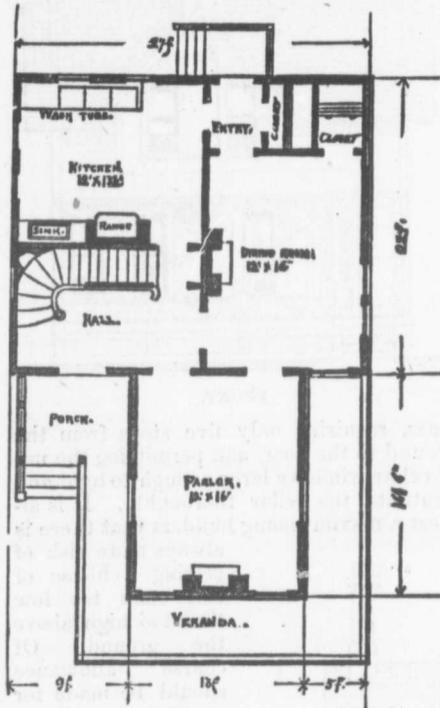
DESIGNS FOR COTTAGE AND STABLE.

ables in respect to their size. Finish the ridges and the hips with a 2½-inch bead, laid upon the ridge boards and upon the shingles of the hips.

The stable design requires no extended explanation, the plan and the two elevations giving all the essential features pretty distinctly. The large door to the carriage-room is designed to be made into two parts, of matched strips upon a plank frame, each part to slide by the other. The internal partitions to be of tongued planks, and the walls and ceiling of the carriage-room to be sheathed with narrow matched boards.

matched and blind nailed. Ceiling of cellar plastered one coat; the rest of the cottage finished with three coats. A cellar is included in the estimated cost of the cottage, and could be added to the stable advantageously.

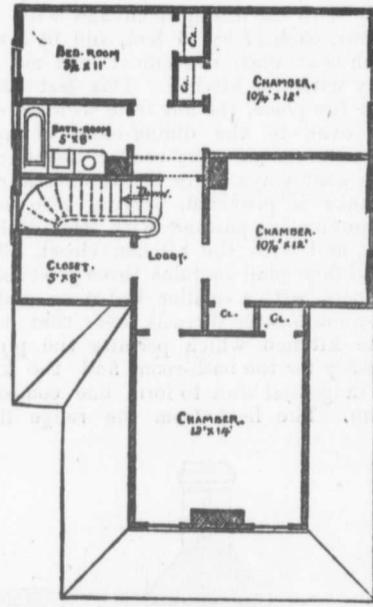
The following is a more complete specification of the material and labour required: Cellar walls for cottage, 5 feet high and 18 inches thick, of stone, pointed upon the inside; underpinning walls 2½ feet high and 10 inches thick, formed of two courses of brick, laid 2 inches apart. Foundation walls of stable started 3 feet below the grade, and carried up 1½ feet above grade. One 12x12-inch pier in the centre to carry floor.



GROUND FLOOR.

First floor of sound 2-inch pine or spruce plank. Horse stalls floored with 2x4-inch pieces, set edgewise and nearly level on the top; to be set one inch apart, the intervening spaces filled up with 1x4 inches at the head, and 1x2 inches at the foot of the stall, so as to secure drainage of the stall floor.

Both the cottage and the stable are intended to be framed with flat 3x8-inch sills, 4-inch wall and partition studs, and 2x9-inch flooring beams; the studs and floor beams to be set 16 inches apart on centers, and the flooring to be bridged with 2x9-inch blocks cut in between the beams. Walls covered with clapboards and filled in with brick; roofs shingled, except the flat roof of the verandah, which is to be tinne. Flooring boards in cottage 1½x5 inches,



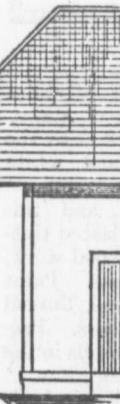
SECOND FLOOR.

Frame.—Sills for house and stable 3x8 inches, halved together at the angles. A cross sill 6x8 inches in stable floor, and one in cottage floor between kitchen and dining-room; flooring beams throughout cottage and upper floor of stable, 2x8 inches, 16 inches on centres; in first floor of stable, 2½x8 inches, 18 inches on centres; all to be bridged by 2x8-inch pieces, cut in and well nailed. Corner posts, 4x4 inches; studs for windows and doors, 3x4 inches; for walls and partitions, 2x4 inches, set 16 inches on centres; studs to be carried up to the full height. Put in 1x4 inch strips to carry the ends of floor beams on the outer walls. Plates, 3x4 inches; rafters for main portion of cottage and for stable, 2x8 inches; for parlour portion of cottage, 2x7 inches, set 2 feet on centres; floor joists for verandah and porch, 2x8 inches, on eight 4x8 inch sills, supported by sound

chestnut o. ground. timber, an 2 feet on c planed and

Roof cov nailed, and shingled w three laps. or copper 1 to finish w ed with 4 roof to be c ed boarding roofing tin ed and sold

Exterior pine, free fr cracks, and and porche of 1½-inch p front porch matched; f with panels in the cupol feet square to within 2 in the sides bottom, and same size in



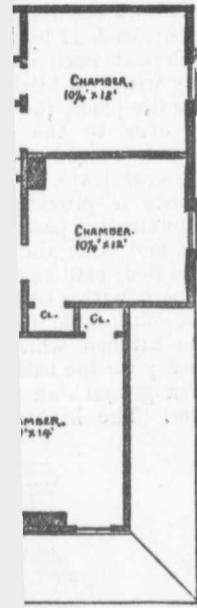
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DESIGNS FOR COTTAGE AND STABLE

led. Ceiling of cellar the rest of the cottage. A cellar is included cost of the cottage, the stable advantage.

more complete specification and labour required: height, 5 feet high and one, pointed upon the walls 2½ feet high formed of two courses apart. Foundation 3 feet below the 1½ feet above grade. in the centre to carry

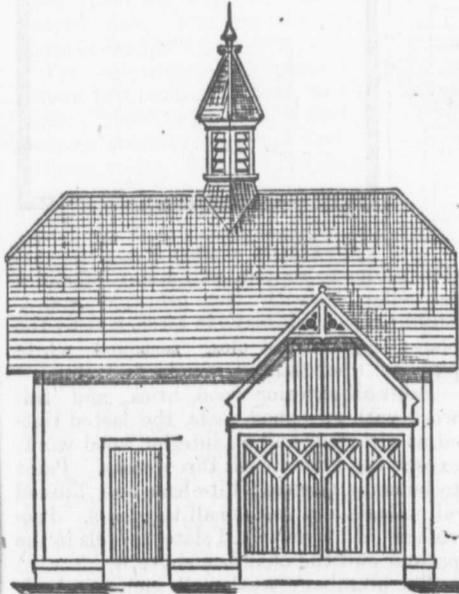


FLOOR. House and stable 3x8 feet at the angles. A stable floor, and one kitchen and dining-throughout cottage stable, 2x8 inches, 16 feet first floor of stable, on centres; all to be pieces, cut in and well 4x4 inches; studs 3x4 inches; for 2x4 inches, set 16 feet to be carried up in 1x4 inch strips to beams on the outer inches; rafters for and for stable, 2x8 feet of cottage, 2x7 feet centres; floor joists h, 2x8 inches, supported by sound

chestnut or cedar posts, set 3½ feet in the ground. Plates for verandah of 3x5-inch timber, and rafters of 2½x5-inch joists, set 2 feet on centres; to be of selected pine, planed and chamfered.

Roof covered with sound boards, well nailed, and finished with gutter and cornice; shingled with best rived shingles, laid with three laps. Valleys to be flashed with zinc or copper 12 inches wide; hips and ridges to finish with bead. Chimneys to be flashed with 4-pound sheet-lead. Verandah roof to be covered with matched and beaded boarding, and finished with best charcoal roofing tin of medium thickness, with leaded and soldered joints.

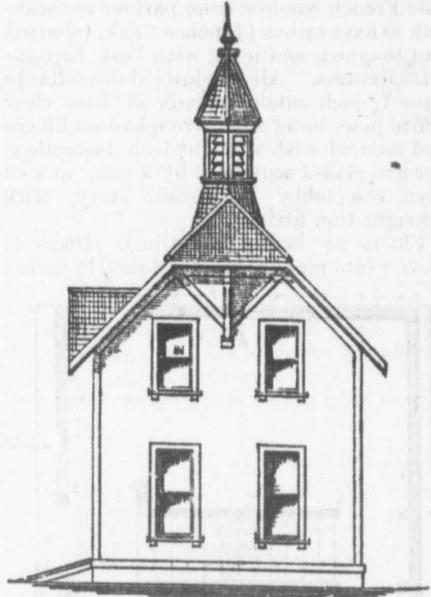
Exterior finish of sound seasoned white pine, free from bad knots, shakes, sap, cracks, and pitch. Flooring of verandah and porches, also the steps front and rear, of 1½-inch pine. That for verandah and front porch to be 4 inches wide, planed and matched; fascia of verandah floor to finish with panels, as shewn on drawings. Within the cupola of the stable build a shaft 2 feet square of matched boards, carried up to within 2 feet of the top of the openings in the sides of the cupola, open at top and bottom, and connecting with an opening of same size in roof, to serve as a ventilator.



FRONT OF STABLE.

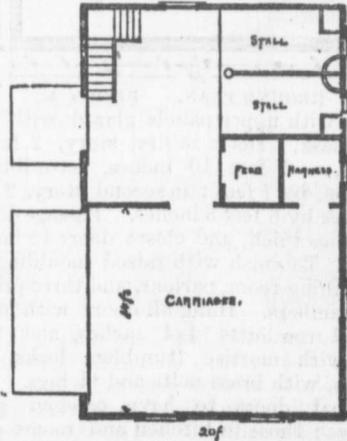
Build three chimneys. Carry over the flue of kitchen chimney to dining-room chimney on proper frame-work. Finish chimneys above the roof as shewn in drawings. Flues 8x8 inches, pargetted throughout, and provided with 5-inch funnel irons as required by the several rooms.

Lay a 5-inch vitrified earthen pipe from beneath the bath-room to the cess pool. Drain to have grade at least ¼ inch to the



END OF STABLE.

foot, and to be laid with cemented joints. Cess-pool to be four feet in diameter and 6 feet deep, laid with brick or stone without mortar, and covered 3 feet below the surface with 4-inch sound plank. Level off the cellar bottom, and finish with 3 inches of cement grouting. Lath all walls, ceil-



ings, and partitions throughout the cottage, including cellar ceiling, with sound pine laths, with four nailings to each lath. Plaster cellar ceiling with one coat of hair mortar, well floated; plaster the rest of the cottage with three coats, finished perfectly white and smooth.

Windows to be glazed with double thick German glass in 1½-inch sashes. Double

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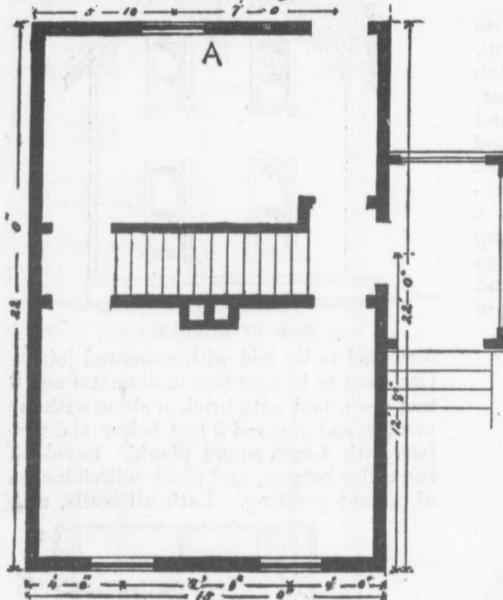
DESIGNS FOR COTTAGE AND STABLE.

sashes to be weather-lipped at the meeting rail, and to be hung with 2-inch axe pulleys, iron weights, and best braided finish cotton cord ; to have best spring centre fastenings. One French window from parlour to verandah to have sashes 1 3/4 inches thick, rebuted and tongued, and hung with best Espagulettes fixtures. All windows above cellar to have 1 1/4-inch outside blinds of best clear white pine, hung with wrought-iron hinges and secured with wrought-iron fastenings. Set one glazed scuttle, 2 by 3 feet, in roof over the lobby in second story, with wrought-iron fittings.

Floors as before described. Doors of clear white pine. Outside doors 1 3/4 inches

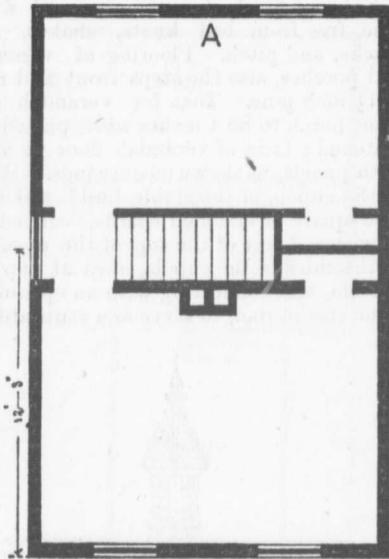
wide. Finish walls of kitchen with beaded vertical sheathing 1/2x3 inches, 5 feet high, capped.

Kitchen closet to have four shelves, dining-room closet to have four shelves and three drawers, each 10 inches deep, with bronzed iron drawer-pulls, and remaining closets to have one shelf each, with double brass clothes hooks as directed ; large closet over hall to have four shelves and three drawers across the outer end. Stairs to finish with moulded treads and beaded front fascia ; to have 7-inch turned newel at the start, with 1 3/4-inch fancy turned balusters, and 3x4 1/2-inch moulded rail, all of best black walnut. Provide proper moveable



GROUND PLAN. DESIGN A.

thick, with upper panels glazed with figured glass. Doors in first story, 2 feet 8 inches, or 2 feet 10 inches, according to position, by 7 feet ; in second story, 2 feet 8 inches by 6 feet 8 inches. Passage doors, 1 1/2 inches thick, and closet doors 1 3/4 inches thick. To finish with raised mouldings in hall, dining-room, parlour, and three principal chambers. Hang all doors with loose-jointed iron butts 4x4 inches, and trim them with mortise (tumbler) locks and latches, with brass bolts and facings. The principal doors to have octagon glass handles ; those in kitchen and rooms over it to have mineral knobs. Provide each of the outside doors with medium sized gong-bells. Door and window finish in parlour, dining-room, chambers over them to consist of beaded castings 6 inches wide, with 1 1/2x3-inches moulded band. Moulded base 10 inches high in first story, and 9 inches in second story. Finish remaining doors and windows with beaded casings 5 inches



UP-STAIRS. DESIGN A.

step-ladder to scuttle, and flight of stairs to cellar beneath the principal stairs. Build three-wash-trays in kitchen as by the plan ; to be of best clear seasoned white pine, set upon turned standards.

Paint all exterior wood, brick, and tin-work with two good coats, the lasted tinted as directed, and all interior wood-work, except the floors, with three coats. Paint to be made of pure white-lead and linseed oil. Grain and varnish all the doors. Provide and set marbleized slate mantels in the parlour and the chamber above it.

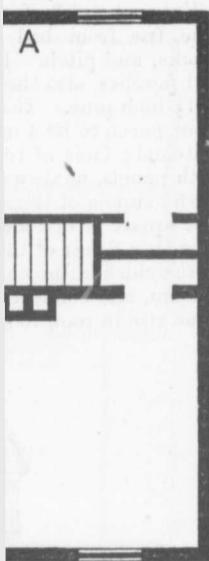
The plumber's work will include a tank over the bath-room, with lead-lining, a pump at the sink arranged to fill the tank, a range or stove with water back, one copper planished 5-foot bath-tub, a copper 40-gallon boiler, one water-closet, one wash-basin, an iron sink in the kitchen, the supply and waste pipes necessary for the above and for the wash-tubs, and a 4-inch cast-iron soil pipe from the bath-room to drain beneath.

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DESIGNS FOR SMALL DWELLINGS.

DESIGNS FOR SMALL DWELLINGS.

THERE is a continual demand on us for plans and estimates of small cheap houses, and this is not surprising, as the majority of people are not rich, and the few rich people are able to pay for special plans from fashionable architects, while the great number of those having small means try to obtain their plans at cheap rates. These specifications are suitable for all three of the designs.

Our readers will see at once that while the designs are plain, there is an artistic beauty about them which we fail to find in many higher priced houses, and we think that they will strike the eyes of all our readers as being at once attractive and beautiful.

By the floor plans marked it will be seen that each house has four rooms; the front room on the first floor in each design being dining and sitting room, and the back room the kitchen. On the second floor there are two good sized bedrooms.

The elevations and plans are drawn to a scale of 8 feet to the inch. The first story is 9 feet 6 inches; second story, 8 feet 6 inches; cellar, 6 feet. The foundation walls to be 3 inches thick, built of brick, forming a cellar under the whole building. Sills to be 4x9 inches; posts, 4x6 inches; ties and inter-ties, 4x6 inches; plates, 4x4 inches; all outside studding, 2x4 inches; wall strips placed 16 inches from centres; first and second story floor beams, 2x9 inches, placed 16 inches from centres, having two rows of cross bridging; rafters to pitch roofs, 2x5 inches, placed 2 feet from centres; rafters on deck of French roof, 2x6; side rafters, 1½x5 inches, placed 16 inches from centres. Cover the sides, ends, and roof of building with 1-inch mill-worked boards, well nailed, covering the sides and ends with tar paper and 5-inch white pine clapboards. The stoops, window-frames, water-table, cornices, etc., to be built in the usual manner of good seasoned white pine lumber, consistent with the plans and elevations. All side roofs to be covered with 16-inch white pine shingles, and all piazza roofs, gutters, leaders, and flat deck on French roof house, together

with the dormer-windows, to be covered with first quality tin. All sash to be 1½ inches thick, double hung with iron weights and hemp cord, and glazed with first quality French sheet glass. All windows (except cellar) to have outside rolling blind shutters. The stoop flooring to be 1½x4½-inch white pine; the flooring on first and second stories to be 1x6-inch spruce. All partition studs to be 2x4 inches, set 16 inches from centres. Stairs made of 1½-inch white pine, steps and strings, and ¾-inch risers. All door jambs, 1½ inches thick; first story casings, 5 inches wide, with a return ¾-inch bead, and one member of back band mould-



ing; ¾x6-inch base, and ¾x2-inch moulding; second story, 4½-inch casings, ¾-inch plain bead, and ¾x2½-inch back-band moulding; ¾x6-inch base, and ¾x2-inch moulding. All passage doors, 1½ inches thick; closet doors, 1½ inches, all hung with 3½x3½ inch butts; mortise locks on passage doors, and reverse bevel rim locks on closet doors; all to have white furniture and plated metal. All sash to have good fastenings. Closets to be shelved. All doors to have four panels, double moulded, and hardwood saddles.

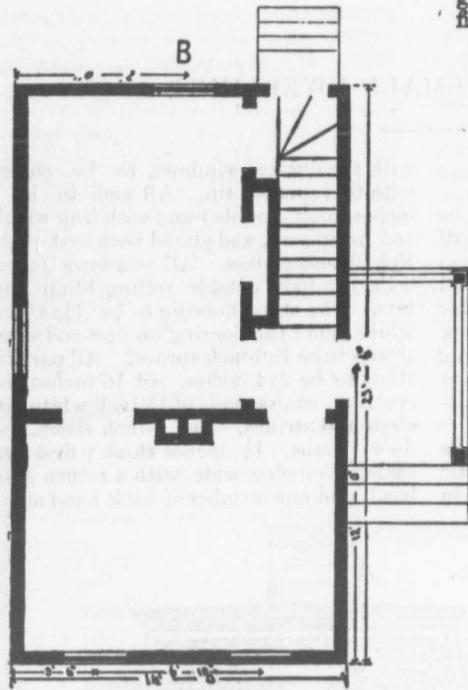
All walls throughout first and second stories to have good white pine lath, two

DESIGNS FOR SMALL DWELLINGS.

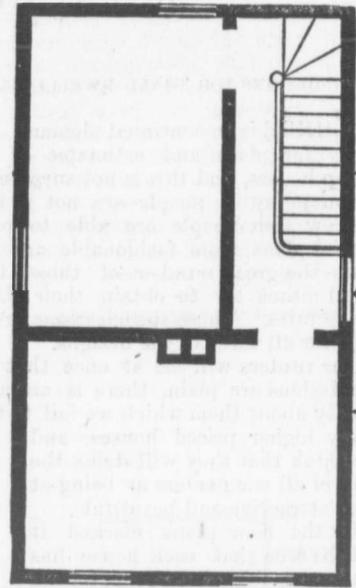
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good coats of brown mortar, and hard finished.

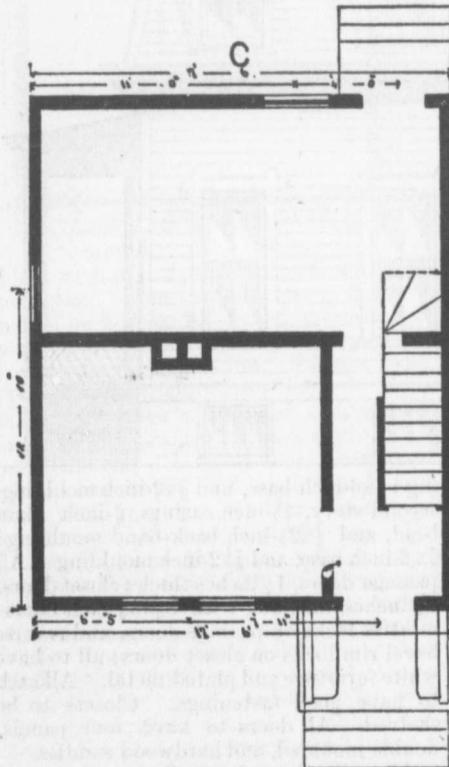
All wood-work on the outside (except



ROUND FLOOR. DESIGN B.

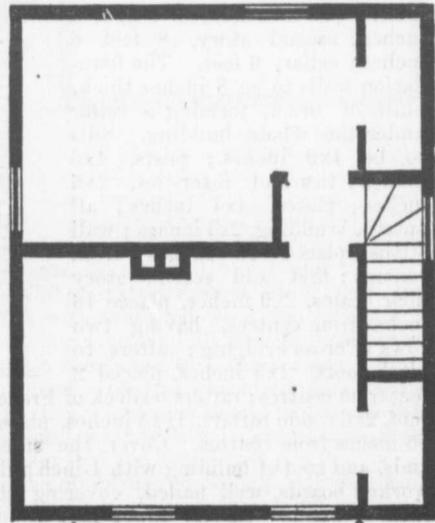


UP-STAIRS. DESIGN B.



GROUND FLOOR. A.

shingles) to have two good coats of pure white-lead and oil paint, painted in colours,



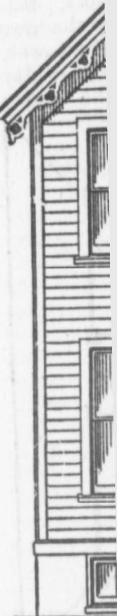
UP-STAIRS. DESIGN C.

and the inside two good coats of white. All tin roofs and gutters to have two good coats of metallic paint.

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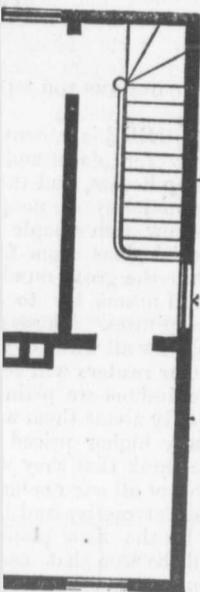


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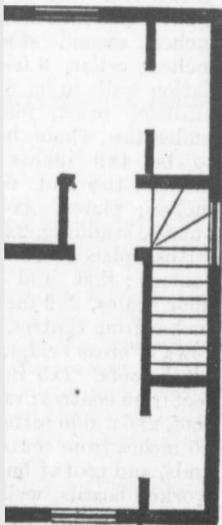
DESIGNS FOR SMALL DWELLINGS.

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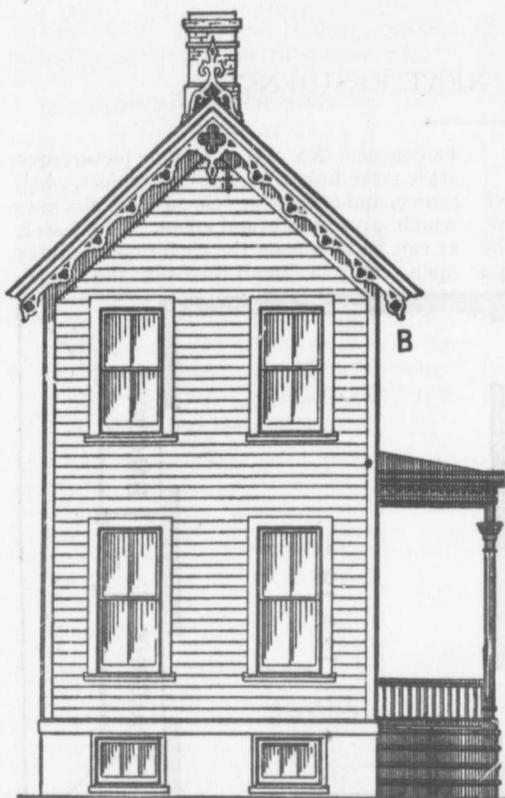
DESIGN B.

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DESIGN C.

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DESIGN B. (SEE PRECEDING PAGE.)

DIRECTIONS FOR PRUNING AND TRAINING FRUIT TREES.

1. The permanency of form in trained trees is dependent on the equal diffusion of sap.
2. Prune the strong branches short but allow the weak ones to grow long.
3. Depress the strong parts of the tree, and elevate the weak branches.
4. Suppress the useless buds on the strong parts as soon as possible, and as late as possible on the weak parts.
5. Nail up the strong parts very early and very close to the wall.
6. Delay nailing the weak parts as long as possible.
7. Suppress a number of the leaves on the strong side, and leave them on the weak side.
8. Allow as large a quantity of fruit as possible on the

strong side, and suppress all upon the weak side.

9. Bring forward the weak side from the wall, and keep the strong side close to it.

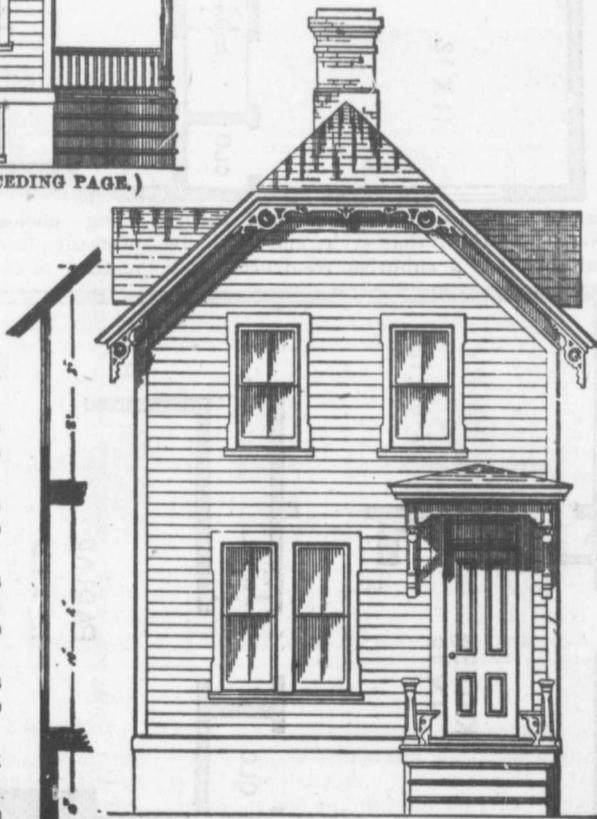
10. The sap develops the branches much more vigorously upon a branch cut short than upon one left long.

11. The more the sap is retarded in its circulation, the less wood and the more fruit-buds will develop.

12. To retard excessive growth, either during autumn root-prune, or remove the trees, or in the spring expose the roots to the sun, and keep manure and water from them; retarding the excessive vigor of the tree leads to its fruit-bearing.

13. Keep the fruits, as far as possible, vertical, and their stems lowermost.

14. Let the leaves lap over the fruit till nearly ripe, when the light as well as heat must be allowed to bear on the other side.



DESIGN C. (SEE PRECEDING PAGE.)

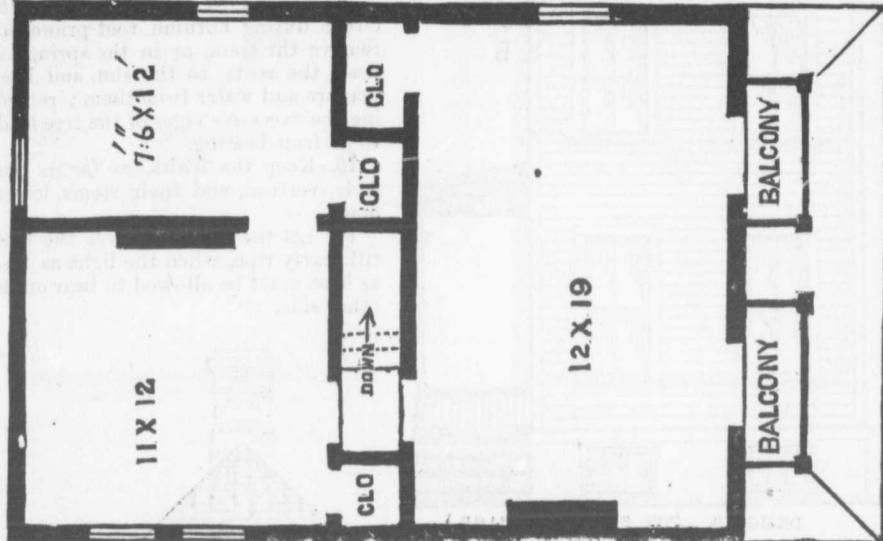
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DESIGN FOR A NEAT RESIDENCE

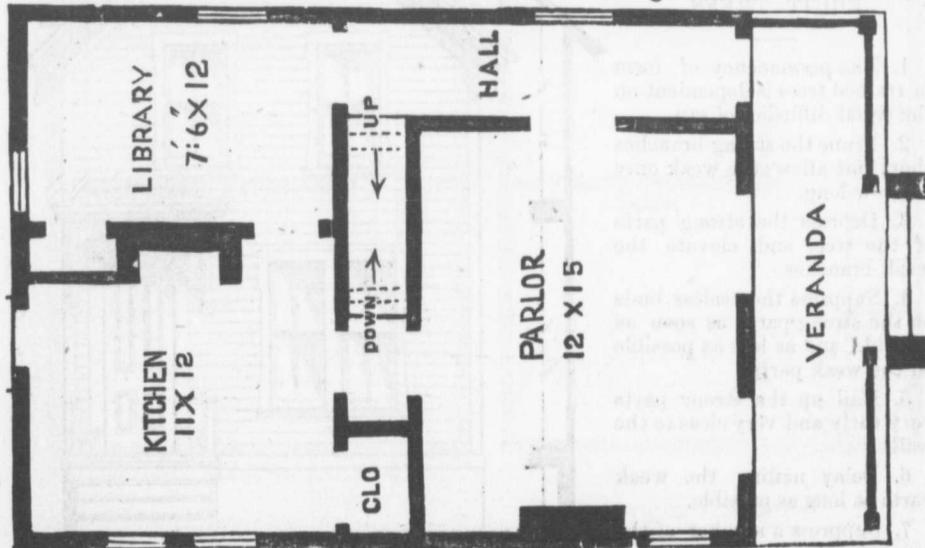
DESIGN FOR A NEAT RESIDENCE.

IN the accompanying illustration we give a plan for a small tasteful cottage, and two different elevations for the same. With a few alterations the design

can be made to conform to both of them; No. 1 is of the Italian style, and would be suitable for a suburban residence. It is



being enclosed, it would make a very pleasant place to sit in summer. The hall, instead of coming out to the front, as in



designed to be built on a 25-foot lot, and is probably the most economical elevation that could be made for the plan combining the same amount of room and con-

No. 1, is recessed back, making a break in front, which gives it a much larger veranda. The entrance from the hall is into the parlor or living-room, as it would probably

be used for with the ki which ther them. Co

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Carpente
joiner's wo pine. Sill plates and 4x9 inches posts to First and inches; fir centres; se to have on bone cross 2x6 inches 2 feet from and well to rafters. to be 2x6 placed 2fe centres. A ars and tri and beam porting cre titions, to inches thi window an studs to inches, re of stu through 2x4 inches 16 inches centres, ar bridged. terior stud be long en reach from plate. Do cessary fur stair soffit The stu through to be r and tenon to fit close bearings, well nailed and botte thoroughly. The sec of beams on 1½x4-in which will into the st the bean of and we necessary etc.

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DESIGN FOR A NEAT RESIDENCE.

be used for that purpose; this connects with the kitchen by a small passage-way, in which there are drawers with shelves over them. Cost will be from \$1000 to \$1200.

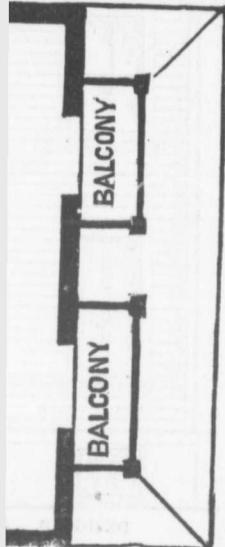
SPECIFICATION OF WORK.

Carpenter's Word.—All the lumber for joiner's work to be well seasoned white pine. Sills, 4x9 inches; posts, 4x6 inches; plates and interties, 4x4 inches; girders, 4x9 inches. Provide 5x5-inch chestnut posts to support the girders in cellar. First and second tier beams to be 2x9 inches; first tier to be 20 inches from centres; second tier, 16 inches. Each tier to have one good row of 1½x3-inch herring-bone cross bridging. Ceiling beams to be

eyes attached to beams to keep open when required. All other frames throughout to have plank hanging and pulley stiles, parting strips outside stops, and stop beads complete; main sills to be 1½ inches, false sills to be 1¼ inch. All sashes throughout to be 1¾ inches thick, and all except those of cellar to have Cowell's patent pulleys and raw hide sash-cord complete. Sashes in parlour and second story front to be glazed with second quality French glass. Water-table to be of 1½ inch plank, corner boards 6 inches wide and 1¼ inches thick.

The whole of the exterior of the building to be first laid with tarred sheathing-paper, then with 5-inch clap-boards, with

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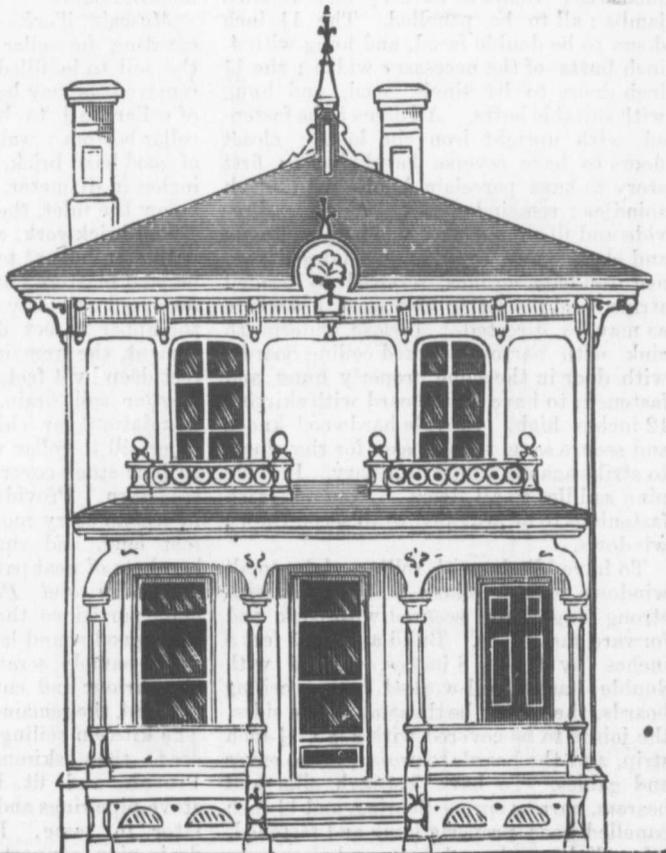


making a break in
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2x6 inches, placed 2 feet from centres and well secured to rafters. Rafters to be 2x6 inches, placed 2 feet from centres. All headers and trimmers, and beams supporting cross partitions, to be 3 inches thick; all window and door studs to be 3x4 inches, remainder of studding throughout to be 2x4 inches, placed 16 inches from centres, and cross bridged. The exterior studding to be long enough to reach from sill to plate. Do the necessary furring for stair soffits, etc. The studding throughout is not to be mortised and tenoned, but to fit close to their bearings, to be well nailed at top and bottom, and thoroughly braced.

The second tier of beams to rest on 1½x4-inch piece which will be let into the studding, the beams to be placed alongside of and well nailed to the studs. Do all necessary framing for chimneys, well-holes etc.

The windows in cellar where shown to have plank frames, rebated for 1½ inch sash, hung at the top with butts and fastened with buttons; to have hooks and



FRONT VIEW. DESIGN NO. 1.

¾-inch lap. Cornice and all outside finish to be as per sketch.

Roof-frame and form of roof as shown: timbers to be as before specified; to be covered with hemlock boards ready to receive the slating. Veranda to have 4x6 inch sills and 2x6-inch beams; posts, 6x6 inches; top rail, 4x5 inches; bottom rail,

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DESIGN FOR A NEAT RESIDENCE.

2x2½ inches; and the open-work out of 1½ inch stuff. Veranda floors to be laid with narrow pine flooring.

Floors to be laid with well seasoned 1-inch mill-worked spruce floor boards, not over 6 inches wide, and all to be well nailed to the beams. Provide and fit up stairs as shown; to have plank steps and strings ¾ inch; risers firmly wedged and glued together; to have rounded nosings. Provide stairs to cellar under stairs, to have plank steps and strings, but no risers.

Parlour to have ⅝ inch beaded casing, 5½ inches wide, with 2¼-inch back, moulding. Remainder of rooms throughout to have ⅝-inch beaded casing 5 inches wide. Base to parlour to have 6-inch plinth and 2-inch moulding; remainder of rooms to have 6-inch base. Doors to have 1¼ inch rebated jambs; all to be panelled. The 1¼ inch doors to be double faced, and hung with 4-inch butts of the necessary width; the 1½ inch doors to be single faced, and hung with suitable butts. All doors to be fastened with upright iron rim locks; closet doors to have reverse bevel locks; first story to have porcelain knobs with black spindles; remainder to be mineral. Provide and fit up necessary shelves in closets and elsewhere. Provide two doxed japanned iron hanging pins, screwed to beaded strips, and placed in closets or elsewhere as may be directed. Inclose underneath sink with narrow worked ceiling boards, with door in the same properly hung and fastened; to have drain-board with skirting 12 inches high. Provide hardwood knobs and secure same to the bases for the doors to strike against where necessary. Provide pine saddles to all doors. Common sash fastenings to be provided to all second story windows.

To have blinds with rolling slats to all windows except cellar; to be hung with strong hinges, and secured with back and forward fastenings. Build a privy 3 feet 8 inches by 4 feet 8 inches, formed with double faced mill-worked pine ceiling boards, the roof to be the same as the sides, the joints to be covered with a ½ x 1½-inch strip, and the boards to project at the eaves and gables. To have 3x4-inch sills and bearers, narrow spruce flooring, and 1½-inch panelled door, properly hung and fastened, a four-light sash and seat and riser complete.

Plumbing and Tinning.—Provide and fit up in kitchen a cast-iron sink 20x30 inches, to be supplied with water by one of Douglas No. 2 lift-pumps, the pump to be supplied with water from the cistern

through 1½ inch lead pipe. Sink to have 1½-inch waste-pipe connected with the drain provided by the mason, and to be tapped with an S-trap. Do all necessary flashing around chimneys, balconies, windows, etc. Line the gutters with tin of the necessary width. Fit requisite 3-inch leaders to convey water to drain. All the above tinning to be done with good I.C. charcoal roofing tin; veranda roof to be covered with tin. The whole of the roof to be slated with good quality roofing slate all to be laid on tarred paper.

Painting.—All the wood-work throughout usually painted to have two good coats of best white-lead and oil paint, and to be of such colours as may be desired. Tin-work to have two good coats of brown metallic paint.

Mason's Work.—Do the necessary excavating for cellar, cis-privy, sink, etc., the soil to be filled in around the house or removed as may be desired. Foundation of cellar wall to be sunk 4 inches below cellar bottom; wall to be 12 inches thick of good hard brick. Cistern to be 6 feet 2 inches in diameter, 5 feet 2 inches deep below the inlet, the sides to be laid up with 4-inch brickwork, and to be arched over, with man-hole at top; sides and bottom to be well plastered up with cement; provide for overflow. Lay up stone wall in privy, the upper 2 feet 6 inches to be laid in cement, the remainder to be a dry wall 3 feet deep by 4 feet, 6 feet deep below the inlet or soil drain. Build the necessary foundations for chimneys. Provide blue-stone sill to cellar windows, also perforated blue-stone cover 2 feet 6 inches square to cistern. Provide two marbled shelves in second story rooms, each to be about 5 feet long, and supported by marbled brackets of neat patterns.

Lathing and Plastering.—All studing and partitions throughout to be lathed with good sound lath, and plastered three coats, namely, scratch coat and brown coat, the parlour and entrance hall to be hard finished, the remainder to be sand skimmed. The kitchen ceiling to be plastered one coat, then skimmed and whitewashed. Provide and fit in chimneys necessary stove-pipe rings and covers; to have ventilator in same. Lay 4-inch earthenware drain-pipe, connected with leader, to convey rain-water to cistern. The cistern to be located 5 feet from the house. Also necessary drain-pipe to convey waste water from kitchen sink to privy sink. The soil-drain to be of 6-inch glazed earthenware, and to connect with privy sink.

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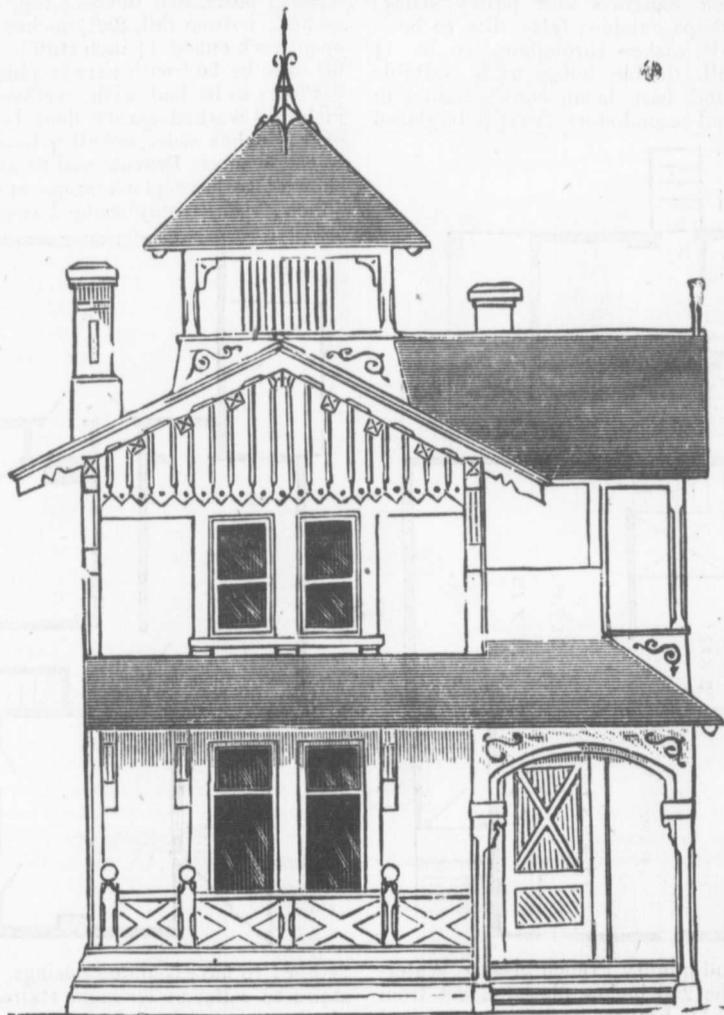
DESIGN FOR HANDSOME RESIDENCE.

DESIGN FOR HANDSOME RESIDENCE.

THE accompanying designs illustrate a very tasty dwelling-house, suitable either for a town or country site. The rooms on the first floor, as will be seen by the plans, are very conveniently arranged,

SPECIFICATION OF WORK.

Carpenter's Work.—All the lumber for joiner's work to be well-seasoned pine; sills, 4x9 inches; posts, 4x6 inches; plates and enteries, 4x4 inches; girders, 4x9 inches. Provide 5x5-inch chestnut posts to support the girders in cellar. First and



FRONT VIEW. DESIGN NO. 2. (SEE PRECEDING PAGE.)

and are so situated as to make each of easy access, airy, and well lighted. The plan of the second floor is equally well arranged, being divided up into four spacious bed-rooms. The execution of this design, including a cellar under the whole, would cost about \$2,000.

second tier beams to be 2x9 inches; first tier to be 20 inches from centres, second tier 16 inches; each tier to have one good row of 1½x3-inch herring-bone cross bridging; ceiling beams to be 2x6 inches, placed 2 feet from centres, and well secured to rafters; rafters to be at top and bottom,

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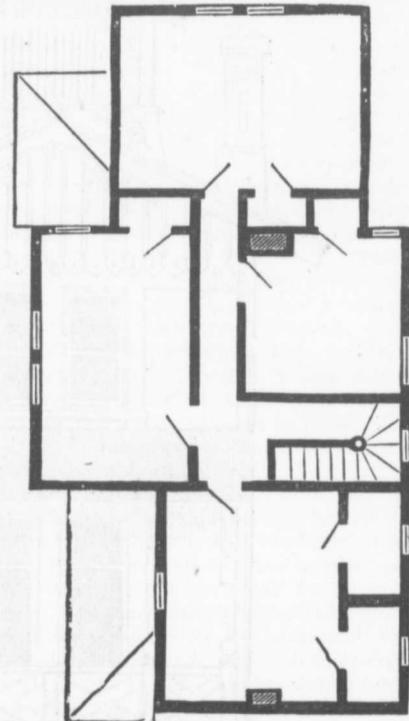
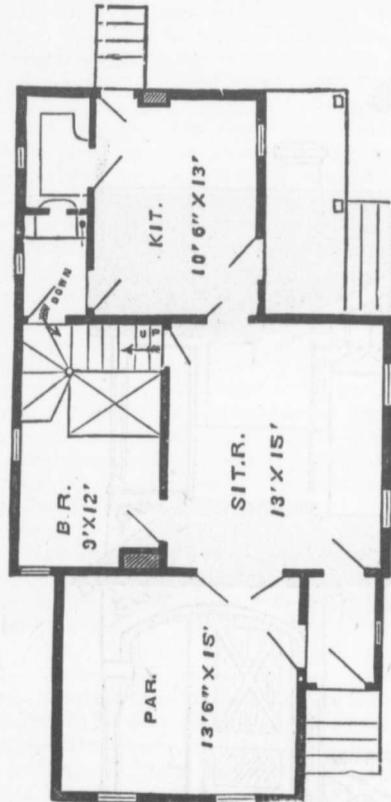
DESIGN FOR HANDSOME RESIDENCE.

and thoroughly braced. The second tier of beams to rest on 1½x4-inch piece, which will be let into the studding, the beams to be placed alongside of and well nailed to the studs. Do all necessary framing for chimneys, well-holes, etc.

The windows in cellar where shown to have plank frames, rebated for 1½-inch sash, hung at the top with butts and fastened with buttons; to have hooks and eyes attached to beams to keep open when required. All other frames throughout to have plank hangings and pulley stiles; parting strips outside; false sills to be ¾-inch. All sashes throughout to be 1½ inches, all double hung with suitable weights and best hemp cord. Sashes in parlour and second-story front to be glazed

tenoned, but to fit close to their bearings, to be well nailed of 1½-inch plank, corner boards 6 inches wide and 1½ inches thick.

The whole of the exterior of the building to be first laid with tarred sheathing paper, then with 5-inch clap-boards, with ¾-inch lap. Cornice and all outside finish to be as per sketch. Roof-frame and form of roof as shown; timbers to be as before specified; to be covered with hemlock boards ready to receive the slating. Verandah to have 4x6-inch sills and 2x6-inch beams; posts, 6x6 inches; top rail, 4x4 inches; bottom rail, 2x2½ inches, and the open-work out of 1½-inch stuff. Verandah floors to be laid with narrow pine flooring. Floors to be laid with well-seasoned 1-inch mill-worked spruce floor boards, not over 6 inches wide, and all to be well nailed to the beams. Provide and fit up stairs as shown; to have plank steps and strings ¾ inch, risers firmly wedged and glued to-



with second-quality French glass. Water-table to be 2x6 inches, placed 2 feet from centres. All headers and trimmers, and beams supporting cross partitions, to be 3 inches thick; all window and door studs to be 3x4 inches, remainder of studding throughout to be 2x4 inches, placed 16 inches from centres, and cross-bridged. The exterior studding to be long enough to reach from sill to plate. Do the necessary furring for stair soffits, etc. The studding throughout is not to be mortised and

together; to have rounded nosings. Provide stairs to cellar under main stairs, to have plank steps and strings, but no risers. Parlour to have ⅝-inch beaded casing 5½ inches wide, with 2½-inch back moulding; remainder of rooms throughout to have ⅝-inch beaded casing 5 inches wide. Base to parlour to have 6-inch plinth, and 2 inch moulding; remainder of rooms to have 6 inch base. Doors to have 1½-inch rebated jambs; all to be panelled. The 1½-inch doors to be double-faced, and hung with 4-

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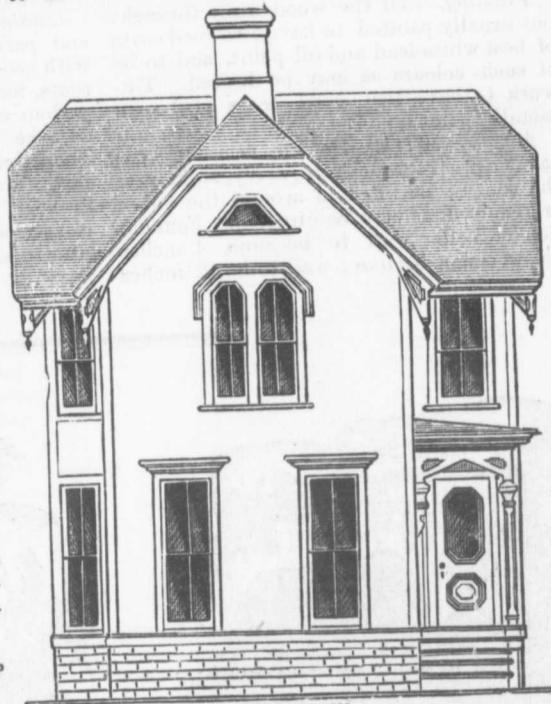
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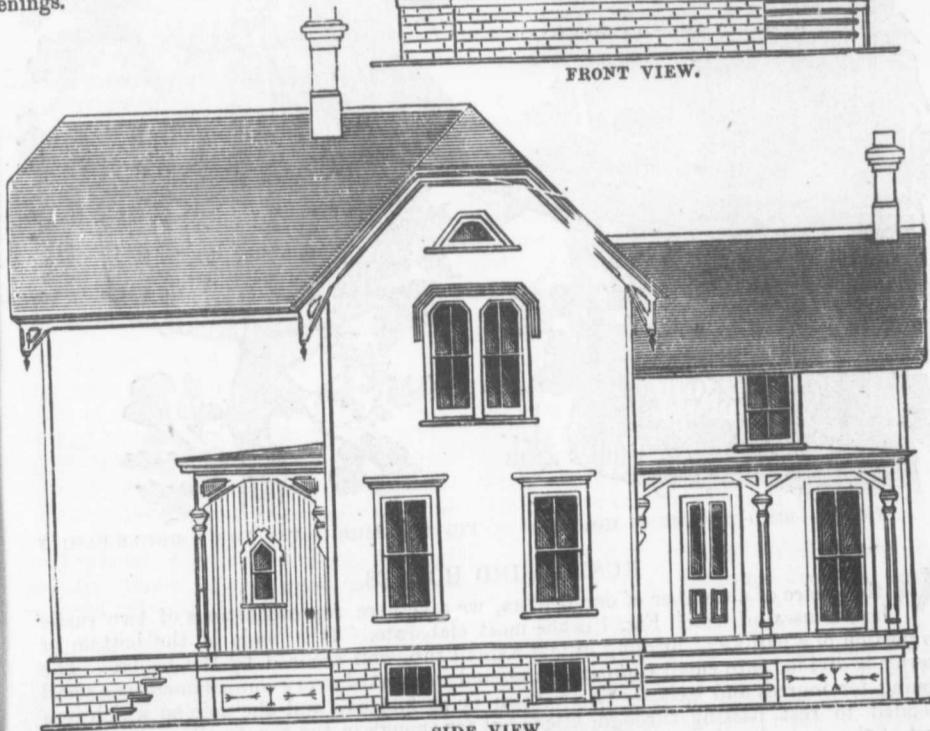
close to their bearings, 1½-inch plank, corner and 1¼ inches thick. exterior of the building tarred sheathing paper. ap-boards, with ¾-inch all outside finish to be f-frame and form of nbers to be as before covered with hemlock eive the slating. Ver- nch sills and 2x6-inch inches; top rail, 4x4, 2x2½ inches, and the -inch stuff. Verandah narrow pine flooring. with well-seasoned 1-ruce floor boards, not and all to be well nailed ide and fit up stairs as nk steps and strings wedged and glued to-

inch butts of the necessary width; the 1¼-inch doors to be single-faced, and hung with suitable butts. All doors to be fastened with upright iron rim locks; closet doors to have reverse bevel locks; first story to have porcelain knobs with black spindles; remainder to be mineral. Provide and fit up necessary shelves in closets and elsewhere. Provide two dozen japanned iron hanging pins, screwed to beaded strips, and placed in closets or elsewhere as may be directed. Inclose underneath sink with narrow worked ceiling-boards, with door in the same, properly hung and fastened; to have drain-board 12 inches high. Provide hardwood knobs and secure same to the bases for the doors to strike against where necessary. Provide pine saddles to all doors; common sash fastenings to be provided to all second-story windows. To have blinds with rolling slats to all windows except cellar; to be hung with strong hinges and secure with back and forward fastenings.

to be tapped with an S. trap. Do all necessary flashing around chimneys, balconies, windows, etc. Line the gutters with tin



FRONT VIEW.



SIDE VIEW.

Plumbing and Tinning.—Provide and fit up in kitchen a cast-iron sink 20x30 inches; sink to have 1½-inch waste pipe connected with the drain provided by the main, and of the necessary width. Fit requisite 3-inch leaders to convey water to drain. All the above tinning to be done with good I. C. charcoal roofing tin. Verandah roof

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DESIGN FOR HANDSOME RESIDENCE.

to be covered with tin, The whole of the roof to be slated with good quality roofing slate, all to be laid on tarred paper.

Painting.—All the wood-work throughout usually painted to have two good coats of best white-lead and oil paint, and to be of such colours as may be desired. Tin-work to have two good coats of brown metallic paint.

Mason's Work.—Do the necessary excavating for cellar, cistern, privy, sink, etc., the soil to be filled in around the house or removed, as may be directed. Foundation of cellar wall to be sunk 4 inches below cellar bottom; wall to be 12 inches

thick, of good hard brick. Build the necessary foundations for chimneys; provide blue-stone sills to cellar windows.

Lathing and Plastering.—All studding and partitions throughout to be lathed with good sound lath, and plastered three coats, namely, scratch and brown coat, the parlour and entrance-hall to be hard-finished, the remainder to be sand-skimmed. The kitchen ceiling to be plastered one coat, then skimmed and white-washed. Provide and fit in chimneys necessary stove-pipe rings and covers; to have ventilator in same.



FIG. 1.—BIRD TENEMENT HOUSE.



FIG. 2.—BIRD HOUSE FOR A SINGLE FAMILY

RUSTIC BIRD HOUSES.

At the desire of a number of our readers, we give here representations of two rustic bird houses, of which Fig. 1 is the most elaborate. It is made of the bottom or top portion of a nail-keg, forming in fact a small tub, well secured by the hoops. The interior is divided into small compartments, and in front of every compartment is a small opening for ingress and exit. The bottom is perforated, and the pole on which it is intended to rest passing through, sticks out far enough in the top to allow the attachment of the straw for the thatched roof, for which birds have a strong preference.

Fig. 2 is a house for a single family; it is made of a small paint-keg, covered with bark, and a roof of bark placed on top. It is placed on a rustic shelf, attached to an old trunk in any way most convenient, but every part must be nailed down so as not to be affected by any strong wind.

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THE FLOWER GARDEN.

THE FLOWER GARDEN.

A CORRESPONDENT says :—" I have a very small space for flowers in front of my house. What flowers should I grow in it to look the neatest and make the best display." In the first place, we would advise even in your small garden to



have the greater part *sod*. There is no more common mistake than supposing that all that is required is to have the greatest possible quantity of flowers in a given space. A small bed of bright colours in the middle of a grass plot is neater and handsomer than a combination of all the

finest and most showy flowers without that circlet of green.

Our first choice of small garden would be *Geraniums*. The single scarlet is probably the most showy and gives most bloom for the labour bestowed upon it. Double *Geraniums* are also very handsome, and give an abundance of green foliage, being generally vigorous growers.

A bed of scarlet *geraniums* with a border of silver leaf or bronze is a most dazzling sight from June to November. For baskets and vases where a show of colour is wanted, they are without a rival.

Next to the geranium, probably the *verbena* is the most satisfactory flower for a small place. If properly cared for and carefully pinned down, a bed of *verbenas* is exceedingly attractive.



of bright colours in the middle of a grass plot is neater and handsomer than a combination of all the finest and most showy flowers without that circlet of green.

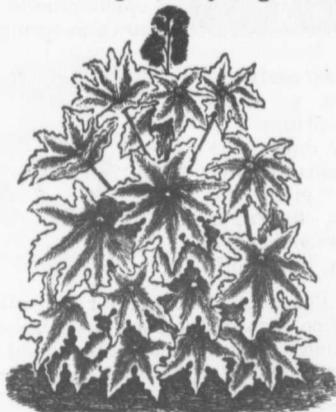
Our first choice of small garden would be *Geraniums*. The single scarlet is probably the most showy and gives most bloom for the labour bestowed upon it. Double *Geraniums* are also very handsome, and give an abundance of green foliage, being generally vigorous growers.



The *Carnation* is one of the sweetest, prettiest flowers that grows. It is beautiful and fragrant, and gives plenty of flowers. It is very hardy, and when the flowers are cut they retain their beauty and fragrance a long time.

RICINUS.

The *Ricinus*, more commonly known as the castor-oil plant, is a showy tree, like half hardy annual, varying from three to eight feet in height ; very large leaves of



glossy green, or bronzed metallic hue. Where stately, majestic plants are required, it is indispensable. Plant the seed in open ground, and as early as safe in the spring.

The *Aster* is now a general favourite and its popularity is on the increase. Give the *Aster* a deep, rich soil, and mulching with coarse manure is very beneficial. Plants may be grown in the hot-bed, cold frame, or seed bed in the garden. The *Aster* transplants easily. Twelve inches apart is the proper distance for making a showy bed of large varieties, and the dwarf kinds may be planted so that they touch. Our engraving shows the habits of the tall *Aster*.



The *Balsam*, one of the most beautiful and popular of our annuals. It is an old favourite, but so much improved during the last quarter of a century that it scarcely bears a resemblance to the old flower. Our climate is well adapted to the growth of the *Balsam*, and with a good rich soil and de-

THE FLOWER GARDEN.

cent care plants and flowers of the greatest excellence may be produced. Always choose the large seeds if you want double flowers.



The pansy is an old favourite of ours and should by all means have a place. Pansy seed may be sown in the hot-bed or open ground; if sown in spring get

it in as early as possible, so as to have plants in blossom during the early rains. Young plants give the largest flowers. Pansies should have a warm, light soil.



The Phlox Drummondii for a brilliant mass of colours and a constant display, is not excelled by any annual or perennial that we are acquainted with. The colours range



from the purest white to the deepest blood purple or crimson. Seed may be sown in the open ground, or in hot-bed, or in cold frames.

In situations suitable for large flowers, we know of nothing better than the Hollyhock, especially when you can procure a good double variety. The flowers are at times as double and almost as pure and perfect as those of the camelia, and when we remember that they mass around a column from three to five feet in height, we get some idea of their beauty. Seeds sown in the spring produce plants that will bloom the second summer and



for several years after, if not allowed bloom too freely the first year.

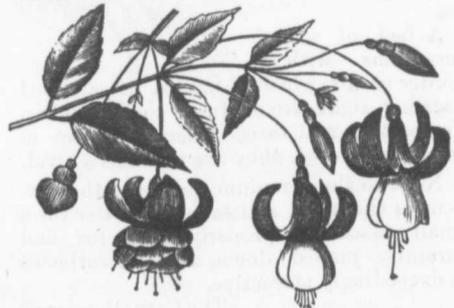


All varieties of Candytuft are very hardy and easy to cultivate. They are quite indispensable for beds and for cutting. Plants bloom more freely if transplanted. In another number we will speak of large and showy plants for larger gardens.



CALADIUM ESCULENTUM.

The Caladium is a singularly handsome and conspicuous plant, having very large beautiful leaves a foot and more in length. The plant will attain a height of five or six feet. Plants are produced from bulbs. Roots obtained in the spring will make good plants in the summer, and in the fall the roots should be taken up and stored in a cellar.



FUCHSIAS,

both double and single, are handsome plants, and will live and thrive in dark, shady spots where no other flowers will grow. Plant your fuchsia in some corner where the sun rarely shines, a mouldy, out one of the way corner, good for nothing else, and it will astonish you by its growth and beauty.

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WEEDS AND THEIR DESTRUCTION.

WEEDS AND THEIR DESTRUCTION.

A WEED has been properly defined as a plant growing out of place. Clover and timothy, so valuable as farm crops when occupying meadows and pastures, immediately become weeds if they intrude into corn and potato fields. More usually, however, the term is applied to those plants, which, in all places and under all circumstances, persist in growing where they are not wanted, and are never cultivated for any useful purpose. Agriculturists have two prominent questions to ask in relation to all such plants—the first, how they found their way into their fields; and, secondly, how to get them out.



ALSE FLAX.

The prevention requires a thorough knowledge of the habits of the plant, and its mode of propagating itself. Some weeds, as annuals, increase only by seeds. Biennials, mostly come under the same head. Some of these, although the individual plants soon die, maintain their hold

by the long vitality of the seeds. Perennials increase not only by seed, but by the extension of the roots; such are the Canada thistle, milkweed and couch grass. Annual plants, as the field mustard, prove most troublesome to spring-sown crops; while biennials, as cockle, Chess, and red-root, find their way among biennial crops, as rye and wheat. Perennial weeds intrude into all.

There are two general rules for the prevention and extirpation of weeds, applicable in all cases. The first, from the well known fact no plant can first grow without starting from a seed, indicates the general caution to destroy all weeds before they can ripen their seed, and to sow for crops nothing but perfectly clean seed. If weeds have already gone to seed, they should be carefully removed and burned. Some of the most pernicious intruders have been widely spread through hay or grass used for packing goods—every careful man will never allow such packing material to be scattered over his land either in manure or



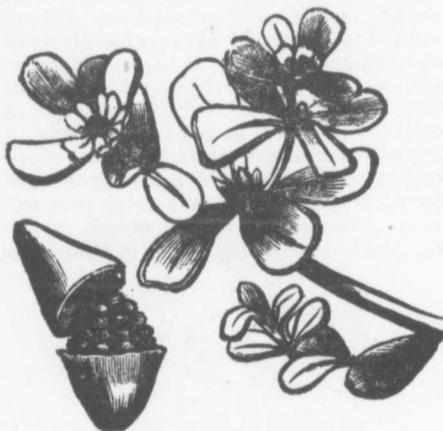
CHICKWEED.

otherwise. The second rule is founded on the principle that no plant can live any considerable length of time without breathing through its lungs, the leaves. Hence all perennial rooted plants, that creep and extend beneath the surface, like the Canada thistle and milk-weed, and thus form formidable patches, may be destroyed completely and totally, if the leaves are never allowed to appear above ground. The best

WEEDS AND THEIR DESTRUCTION.

and most practicable modes of applying these two rules, must vary with circumstances and with the different plants, and will be separately pointed out when treating of the character and habits of each individual.

Of the 80,000 different species of plants which grow upon the face of the earth, only a few thousand have ever had an opportunity to grow in cultivated fields. Of these few thousand, a very small number have become distinguished for their vigor of growth under neglect, for their tenacity of life, and rapidity of increase. These few have thus become troublesome weeds. Neglected cultivation and careless management have tested them thoroughly for their bad qualities, and have the means of selecting them from their thousands of harmless



PURLANE.

associates, and introducing them into the fields of the farmer.

The yearly loss to the farmers of the United States, occasioned by weeds, amounts to many millions of dollars—enough probably to build an Erie or New-York Central Railroad, dig an Erie Canal, or build and endow one hundred first-class agricultural colleges. With many land-owners, one-fourth part of the corn crops is consumed by pig-weeds, fox-tail, and other intruders, and an equal proportion of meadow and pasture land occupied with mulleins and thistles, johnswort and brier bushes. With others the loss is still greater, while a few good managers lose little or nothing. Admitting it to be but a tenth part as an average, what is the result? The aggregate value of all the crops of the country, is doubtless at least eight hundred million dollars yearly, and but a tenth part of this is eighty millions—a sum far exceeding the estimate just offered, and enough to make the two great railroads and the Erie canal combined. The subject is

therefore of sufficient magnitude to merit some attention.

The list here described is divided into annual and biennial, which increase mainly by seeds; simple perennial, which multiply mostly in the same way; creeping perennial, which increase not only by seeds, but by the extension of the roots, and noxious and intruding shrubs.

I. ANNUAL AND BIENNIAL WEEDS.

These weeds increase mostly by seeds. Some multiply with a rapidity that is almost incredible—and careless observers are therefore induced to adopt such errors of opinion as spontaneous increase without seed, and transmutation of sown crops to the weeds themselves. As an example of this prolific character, the writer has counted three thousand seed on a single chess plant, when allowed to grow freely on rich soil, without the smothering influence of wheat or other dense crops. Three thousand the first year would be nine million the second, twenty-seven thousand million the third, which would be about thirteen bushels, (counting two million seed to the bushel,) thirty-nine thousand bushels the fourth, one hundred and seventeen million bushels the fifth, three hundred and fifty-one thousand million bushels the sixth—enough probably to seed the whole earth—showing the prodigious multiplication when under favourable circumstances. Some other weeds increase as rapidly. The importance of literally rooting out such intruders at their very first appearance—of nipping the evil in the bud—is obvious.

Wild Mustard or Charlock, (*Sinapis arvensis*.)—An introduced plant, and being an annual, it is becoming quite troublesome in grain crops sown in the spring. Although each plant dies every year, yet as the seeds retain their vitality a long time, it is difficult to extirpate it after the soil becomes infested. A system of rotation in which spring-sown crops are not frequent, and weeding out by hand as soon as the yellow blossoms show themselves in spring, are the best remedies.

Shepherd's Purse, (*Capsella bursa-pastoris*.)—A well-known annual weed, frequent in waste places and in neglected gardens, and easily extirpated by good culture.

False Flax, (*Camelina sativa*.)—An annual plant, introduced with flax seed, and a common weed in that crop—falsely believed by some superficial observers to be degenerated flax. The remedy is to sow clean seed, and alternate flax with other crops.

Chickweed, (*Stellaria media*.)—Although an annual, its extreme hardiness causes it

to grow in damp soil. Underdrain will subdu

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or Charlock, (*Sinapis alba*) is a cruciferous plant, and being a common and troublesome weed, sown in the spring, it dies every year, yet retains their vitality a long time, and extirpate it after the winter. A system of rotation of crops are not frequent, and should be taken by hand as soon as the weeds themselves in spring,

se, (*Capsella bursa-pastoris*)—A well-known annual weed, common and in neglected fields, extirpated by good

melina sativa,) — An annual weed, introduced with flax seed, and in that crop—falsely called pernicious observers to be extirpated. The remedy is to sow alternate flax with other

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to grow and flower during winter. On damp soils it is often quite troublesome. Underdraining and frequent cultivation will subdue it.

Purslane, (*Portulacaoleracea*),—An annual weed, spreading over the surface, and becoming very troublesome in gardens in summer, on account of its extreme tenacity of life, after the stem is cut off. Removal

rarely gets much possession of cultivated fields, it is not a great pest.

Clot-bur or Cockle-bur, (*Xanthium strumarium*)—An annual not a formidable weed, but frequently quite troublesome—the burs adhering to the fleeces of sheep. It is easily subdued by cultivation. The thorny clot-bur (*X. spinosum*) is a worse



RAG-WEED OR BITTER-WEED.

from the land, or burying, are therefore advisable, after passing the hoe over the surface.

Rag-weed or Bitter-weed, (*Ambrosia trifida*),—Another species, *A. artemisiifolia*, is similar, but smaller. Both are annuals, and find their way into cultivated fields, the latter in the stubble, after grain. Clean culture and rotation in crops are the best remedies.

Bur Marigold, Stick-tight, or Spanish Needles, (*Bidens frondosa*),—The seeds of this plant are oblong, and are furnished at one end with two barbed awns, which cause them to adhere when ripe to clothing and the coats of animals, and when numerous the whole surface becomes coated and black with them. It is not a formidable weed, and only accompanies neglected cultivation. It is strictly an annual. The same Spanish Needles more properly belongs to another species, *B. bipinnata*.

Mayweed, (*Maruta Cotula*),—A well-known annual, usually enduring the winter, growing often abundantly along roadsides, and possessing a disagreeable odour. As it



CLOT-BUR OR COCKLE-BUR.

plant, and is becoming introduced into the southern portion of the United States, and in the suburbs of cities farther north.

Wild Chamomile or Large Mayweed, (*Anthemis arvensis*),—This is nearly allied to the preceding, and by former botanists was placed under the same generic head. It is distinguished from the Mayweed by its darker green below and more hoary appearance above, by its more aromatic and less offensive odour, its more coarsely cut leaves, and more especially by its far more pernicious character. It is not yet extensively introduced, but in some places has found its way into winter grain fields, and by its dense spreading growth in autumn and spring, sometimes nearly chokes out the young crop. It is very difficult to extirpate after it once obtains large possession; but is best treated by adopting a rotation of crops in which

winter grain rarely occurs. It is an annual but generally assumes the character of a biennial, especially in winter grain crops.

Thistle or Horse Thistle, (*Cirsium lanceolatum*.)—A coarse rough biennial plant, from two to four feet high, growing abundantly in neglected pastures throughout the northern States. It flourishes in rich soils, and by occupying the ground greatly lessens the crop of grass. It spreads extensively by its seed, which, attached to the pappus or plume, float on the wind through the air. It is easily destroyed by cutting off the root with a stiff hoe, below the surface. If this is done when in blossom, the root will not sprout again.

Burdock, (*Lappa major*.)—Widely known as a coarse, rank, bitter weed, with large very adhesive burs, which become entangled in the wool of sheep, hair of horses and cattle, and in clothing. Biennial, and easily destroyed with diligence, by cutting off the roots a few inches below the surface, although some years are usually required to eradicate them completely. They may be removed from grass ground without destroying the turf, by thrusting down a narrow spade, ground sharp, to cut off the root, and then lifting out the plant and treading the surface. The best time to do this is just as the flower buds form.

Mullein, (*Verbascum Thapsus*.)—A widely known biennial weed, common in the pastures of slovenly farmers, along the borders of roads, &c. It sends up the second year a single tall stem, which bears many minute seed, and when ripe these are scattered abundantly on the ground and carried in the hair of domestic animals. The plants are easily destroyed by cutting off with a hoe, or by pulling them up the second year when the soil is softened by heavy rains.

Red Root, Pigeon weed, Gromwell, Stone weed or Stein-kraut, the latter corrupted into "stink root," (*Lithospermum arvense*.)—This is one of the worst weeds with which the farmer has to contend; and although an annual, assuming the character of a biennial, and spreading only by seed, it is far more difficult to eradicate than the Canada thistle. As one of its names indicates, the root is red; the whole plant somewhat rough and hairy, (very rough when dead and dry,) from 8 to 12 inches high, more or less branched, leaves narrow and about an inch long, flowers small, nearly white, seeds hard or stone-like, whence another name, stein-kraut or stone weed, and the generic name *Lithospermum*. These seeds are remarkable for retaining their vitality for years when deeply buried, or if warmth, air and moisture are withdrawn. It is this quality which renders

the plant so difficult to eradicate from the soil. The seeds may be deeply buried by ploughing, and remain dormant while successive crops of grain are taken from the land by shallower cultivation, until deep ploughing again brings them to the surface. During this interval the farmer may have supposed his soil free from the pest, to be disappointed when brought up to air and moisture. It is the great enemy of the



RED ROOT.

wheat crop; and when it has once taken possession of the field, it will nearly run out the grain.

Some farmers, by taking it early, or before it has spread much in their fields, have succeeded in keeping this weed in small numbers or wholly eradicating it, by weeding it annually from their wheat by hand, going over the fields two or three times in spring, and making a regular job of it like any other yearly work. One farmer found it necessary to expend forty days labour the first year in this way, but in a few years the weed became so reduced that three or four days were found sufficient, and no doubt a continuation of this care would clear out the last plant. Where,

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however, it has taken extensive possession, a more rapid and wholesale process must be adopted, at least for a time. A good one is the following: For the first wheat crop, plough the ground very deep, at least eight inches, for which purpose a double Michigan plough will answer well. This will throw the seed down beyond the reach of vegetating, and the wheat may be sown on the inverted surface and escape for one year. It will be perceived that success in this instance depends entirely on a single ploughing; if this does not reduce the soil to a proper condition for sowing, the process should be completed by means of a two-horse cultivator or gang plough. All the red root which appears should be pulled out from the wheat in spring by



HOUND'S TONGUE.

hand. In the fall, plough as deep as for the wheat, which will throw the seed again to the surface. Harrow well, and the seed will germinate. The next spring, turn the weeds under with a gang plough, or cut them to pieces with a large steel-tooth cultivator, and sow oats, barley, spring wheat, or peas—the latter is best in the way of rotation. Plough and harrow again in fall, to start another crop of weeds, and plant corn, cultivating it thoroughly. The following year the land may be seeded to clover or grass; and when wheat is again introduced in the rotation, but few weeds will be found, which may be pulled out by hand. It is important that no seed should be returned to the soil through manure; and hence it may be best, when the straw

contains much, to burn it in the field in a compact heap. The seed is sometimes spread to other farms by throwing the plants into the road, when in muddy weather they adhere to the soil on waggon wheels, and are carried to a distance.

Green Amaranth, sometimes called Pig Weed, (*Amaranthus hybridus*),—A coarse annual weed, with a green branching stem; flowers small, green, packed into close



GREEN AMARANTH.

spikes, with bristle-like hairs among them. It finds its way into cultivated grounds like the preceding, and is to be similarly treated. The seeds are quite small, black and shining, and very numerous. There

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WEEDS AND THEIR DESTRUCTION.

are several species or varieties, not very distinctly defined.

Hound's Tongue, (*Cynoglossum officinale*,) —A coarse plant growing along roadsides, about two feet high, bearing purple-red flowers, and flat seed roughened all over with short barbed or hooked prickles, causing them to adhere to clothing and to the hair and wool of animals. It is biennial, and is destroyed in the same way as the burdock, mullein, &c.

Jamestown Weed or Stink Weed, (*Datura stramonium*.)—A coarse foetid plant, growing on roadsides and waste places, often several feet high. The leaves are large, the flowers tubular, nearly three inches long, and the seed vessels an inch and a half long, and covered with coarse fleshy-prickles. It is an annual, and is easily destroyed.

Lambs' Quarters. Goose-foot or Pig Weed, (*Chenopodium album*.)—An annual weed, often growing abundantly in gardens and other cultivated grounds; the stem often growing three or four feet high, angular or grooved, often with some purple stripes; leaves with a mealy appearance; flowers small, numerous, green; seeds small and numerous, and the plants are thus rapidly increased where neglected cultivation prevails. The remedy is very simple—destroy all the plants with the plough, hoe or cultivator, before they attain more than an inch or two in height. The labour will be small at this time, compared with that required after they are a foot high; and none can go to seed.

Wild Teasel, (*Dipsacus sylvestris*.)—Common along roadsides and waste grounds. It is biennial, and is easily destroyed by mowing the second year, before the seed is formed.

Chess, Cheat, or Broom Grass (*Bromus secalinus*.)—One of the most troublesome weeds which infest the wheat fields of this country. The panicle is branching and spreading, and bears numerous spikelets. This weed was formerly supposed by some to be produced from degenerated wheat; but the fact that it belongs to quite a distinct genus from wheat, renders this impossible. The following are the principal causes for the adoption of this remarkable notion:—

1. The seed of the chess plant are much smaller than those of wheat, and may be numerous scattered through seed wheat, and reproduce the weed among the stubble, unperceived to ordinary observation.
2. The seed being very hardy, may remain at some depth in the soil, unper-



CHESS.

ceived, and dormant until brought near the surface, and subjected to the action of light, air, and moisture. A bushel of chess contains over one million seeds; yet a bushel is only one twenty-thousandth part of the soil on an acre of ordinary depth; hence there may be a million chess seeds through the soil, and yet, constituting but a twenty-thousandth part of its bulk, be wholly imperceptible to observation

3. When the young chess plants, growing from this seed, are shaded by a dense crop of wheat, they grow only a few inches high, sometimes not over two inches, perfect their seed, and are wholly unobserved; but when the wheat is winter-killed, or otherwise destroyed, they spread and grow upwards unchecked, three feet high (as at a), and often produce from two to three



CHESS, CHEAT, OR BROOM GRASS.

thousand seed to a single root, cover the whole surface, and lead to the superficial conclusion that the wheat, being killed, was converted to chess.

Those who advocate this notion of transmutation, have claimed that among the

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countless millions of plants which change every year from wheat to chess, many might be caught in the act, furnishing a head of wheat and a head of chess from the same root. The writer, having often heard of such curiosities, but never finding any, offered a reward of five hundred dollars, a year or two ago, which offer he published in the *Country Gentleman*, and kept it standing for several months. But no double plant was presented. From the value of the prize, offered during a pecuniary pressure, the conclusion was adopted that no such plant existed.

The process for the eradication of this weed is simple—namely, sow none but perfectly clean seed, and it will gradually disappear from the land. Many thorough farmers have adopted this mode, and have completely extirpated it from their farms. The improved modern fan-mills (of which Nutting's is the best) have greatly facilitated this object, and chess has become a less formidable weed than formerly.

Foxtail Grass (*Setaria*).—There are two species which are often abundant in corn-fields, and spread rapidly by seed. The common Foxtail (*Setaria glauca*) has a tawny, bristly, cylindrical spike; and the other (*Setaria viridis*) a larger and green spike. They are easily destroyed when they first appear above the surface; and being never allowed to go to seed, soon disappear.

II.—SIMPLE PERENNIAL WEEDS.

Tall Crowfoot or Butter-cup (*Ranunculus acris*, acrid *Ranunculus*).—An introduced weed, common in meadows and pastures in many parts of the Northern States. It is not a formidable weed. It is easily eradicated by good cultivation in connection with rotation of crops.

John's-wort (*Hypericum perforatum*, or perforated *Hypericum*).—A well-known and very troublesome perennial weed, and often occupying neglected pastures to such an extent as to greatly diminish or exclude the grass crop. Good cultivation and rotation will extirpate it. Sheep eat it when it is young and tender, and thus tend to keep it down—but sweet grass and clover are much better food for these animals, and they should not thus be compelled to suffer from the bad husbandry of their owners. Dr. Darlington remarks, in alluding to the fact that it was named "St. John's-wort," from its supposed power of keeping off evil spirits on St. John's night, that "the custom is still followed in the retired part of the Pyrenees, of hanging garlands of the herb over the doors, to preserve the inmates of the house from 'storms, thunders, heretics, and other evil spirits.'"

Plantain.—There are two common species of the plantain, known as the *Plantago*

major, or broad-leaved, and *P. lanceolata*, or narrow or lance-leaved. Neither of them are formidable weeds, although somewhat troublesome. The broad-leaved is common along foot-paths and in door-yards, and is sometimes called by the aborigines "the white man's foot." The lance-leaved spreads more extensively, often prevailing to a considerable extent in pastures. Both are perennial-rooted, and they may be destroyed in a small way by cutting off the root beneath the surface, and on a larger scale by rotation of crops and thorough culture. The seeds being about the size of red clover seed, are often sown with the



FOXTAIL GRASS.

latter. In some places the narrow-leaved is tolerated as a forage plant—and although not a decided pest, farmers would be better without it.

Poke or Pokeweed (*Phytolacca decandra*).—Well known by its rank, fleshy, and



OR BROOM GRASS.
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WEEDS AND THEIR DESTRUCTION.

succulent growth, and by the abundant purple juice of its berries. The root is perennial, and easily destroyed by cutting off with a stiff hoe below the surface.

Water Hemlock (*Cicuta maculata*, or spotted Cicuta).—The stem and leaves, and the root more especially, are deadly poison. The aromatic quality of the plant sometimes induces children and others to eat it, endangering or destroying their lives; and it is also sometimes fatal to cattle. Hence it should be carefully extirpated. The stem is spotted with purple or marked with short streaks. The root is perennial. Perhaps the most dangerously poisonous plant known.

Poison Hemlock (*Conium maculatum*, or spotted Conium).—This plant somewhat resembles the preceding, but is a thicker

thrive when driven by starvation to eat unpalatable food. A correspondent of the *Cultivator* says that a large farmer succeeded in killing most of the daisies on a sixteen-acre lot, by turning in five hundred sheep a week at a time—but it was a very expensive experiment, for the sheep became extremely poor, and he regarded his loss at one thousand dollars. Thorough cultivation is the best remedy, and may be given as follows:—Plough the sod thoroughly, plant corn, hoe and cultivate well once a week. Next year sow and plough in two crops of buckwheat, and the third year manure and plant corn again; then again two crops of buckwheat for two years more, when the daisies will have vanished and the land be left rich. This weed grows

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Mallow, known by it



JOHN'S WORT.

and ranker grower, and has a disagreeable odour. It grows abundantly in some places along roadsides. The root is perennial. It is easily destroyed by mowing just before seeding, and by cutting up the roots.

Ox-eye Daisy, or White Daisy (*Leucanthemum vulgare*).—A perennial-rooted weed, and one of the worst the farmer has to contend with, on account of its extensive spreading, and the great difficulty of its extirpation. The seed are very tenacious of life, and will vegetate after passing through the stomach of an animal. The wide foothold it has obtained is of course the result of slovenly farming, and is most conspicuous in pasture fields, whitening the whole surface when in flower. Various means have been devised for destroying it. Attempts have been made to turn it to account by compelling animals to eat it. Sheep may be made to feed on it by depriving them of all other food, especially early in the season while the young plants are tender and less bitter than afterwards; but it is bad economy, and they cannot



OX-EYE DAISY.

best usually in poor pastures, where there is not enough fertility to cause the growth of interfering plants. On rich ground, tall and dense grass will soon overtop and partly smother the weeds.

Sour Dock, or Curled Dock, (*Rumex crispus*).—Well known by its long narrow leaves with curled margins, and its numerous, brown, triangular seed. It is a perennial, and is easily eradicated by a moder-

and its ci troublesome weed.

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ate amount of labour in pulling up the roots before the seeds form, while the ground is soft from recent rains; or if too hard, they are cut off by a sharp narrow tool. There is another species. (*R. obtusifolius*.) with broader, rounder leaves, which is to be treated in the same way.

Mallow, (*Malva rotundifolia*.)—Well known by its round leaves, prostrate stem,



MALLOW.

and its circular fruit. It is somewhat troublesome in gardens, but is not a formidable weed.

Sorrel or Sheep Sorrel, (*Rumex acetosella*.)—This plant is quite similar in its character to the sour dock, but much smaller in every respect. It grows from six inches to a foot high, with a slender, branching, and angular stem, the whole plant of a strong and rather agreeable acid—and when in large quantities giving a peculiar reddish appearance to the field. It usually grows most abundantly on sandy soils, more particularly those of a rather dry and sterile character, but often on richer loams. In the former case, lime or ashes, or both, have tended to expel it; and in the latter, through culture. Neglected and superficial cultivation is to be avoided in all cases; and seeding down very densely with clover and a small portion of timothy, tends to drive it out. On the exhausted lands of Virginia, dressings of lime and marl have destroyed it thoroughly—in other regions, these applications alone have produced little effect, and the use of the plough, cultivator and hoe have become indispensable.

Garlic, Field Garlic or Wild Garlic, (*Allium vineale*.)—Nearly allied to the onion, and growing in many places extensively in meadows and pastures. It imparts a strong and disagreeable odor to the milk and butter of cows which feed on it. It is subdued by a rotation of crops with thorough culture.

Nettle, (*Urtica dioica*.)—A rough upright plant, growing along fences and in waste places, armed with stinging hairs, which

produce an intolerable itching in the skin for a short time after application. Darlington quotes Culpepper as remarking, in allusion to this quality, "that they may be found by feeling on the darkest night." The root is perennial, and the plant easily



NETTLE.

destroyed by cultivation. There is a smaller species, (an annual,) which, like this, was introduced from Europe, and a native species, with broader leaves, growing in moist places and along the borders of streams, all of which have similar properties; but the first only is much known as a weed.

Sweet Flag or Calamus, (*Acorus calamus*.)—Known by its strong aromatic character and odor, by its dense mass of creeping roots, and by the yellowish-green spadix or fleshy spike of flowers at the middle of the leaf-like stalk (or scape) which supports it. It often obtains possession of wet or swampy lands to the exclusion of everything else. To eradicate it, first drain the land, and then repeatedly plough with a steel mouldboard, and harrow, for two seasons. Where the land cannot be drained, the mass of plants may be cut into blocks with sharp spades, and thrown into heaps. When dry, remove these blocks of roots, and convert them to compost in layers with stable manure. Seed the cleaned land with red-top, or timothy if dry enough. The small fibrous roots which run downwards from the large creeping ones, are easily cut off with a spade or sharp plough, and will not grow. In any case, where the plough may be used for cutting up the mass, it would be well to



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WEEDS AND THEIR DESTRUCTION.

pile up; and when dry to cart off the pieces and convert them to compost.

Cat-tail Flag or Cooper's Reed, (*Typha latifolia*.)—Conspicuous for its long leaves and large cylindrical spike, growing in swampy places. Underdrain the land, or cart on earth, or both—and then seed with red-top; or, if well drained, with timothy.

III. CREEPING PERENNIAL WEEDS.

Canada Thistle, (*Cirsium arvense*.)—This is a formidable weed in two respects. Like the preceding it spreads extensively by seed, and the roots being both perennial and creeping, the plants quickly extend into patches beneath the surface. The roots have been sometimes found several feet below, in porous subsoils; and as the fragments of roots are sufficient to produce new plants, it was formerly supposed to be incapable of eradication, without digging out every portion—which, in a large patch, would involve immense labour. This opinion has now been found to be fallacious,



CANADA THISTLE.

and by the observance of a simple principle, the whole subterranean net-work of roots

may be easily destroyed. The roots cannot live, unless they breathe through their lungs, the leaves. Keep the portion of the plants above ground from growing, and the whole patch may be destroyed in a single year. This may be accomplished in several ways. Small patches may be smothered by covering with boards, closing the joints with a second layer, to prevent a single plant from finding its way through. Sawdust, tan, or straw, will accomplish the same end, if laid on thick enough. If a single plant, however, escapes, it will sustain life in a portion of the roots. Another way is to cut the plants off daily even with the surface of the ground, so that a single leaf cannot grow. The best way for common practice is to plough them under, and continue the ploughing often enough to keep them smothered. If well and deeply done, once a month will answer the purpose. This mode succeeds best on heavy clayey soils which do not permit the thistles to find their way readily upwards. But even on such soils, the work must be very carefully performed, for if a portion of the weeds are but partly covered, they cannot be destroyed. On gravelly and other porous soils, it is more difficult to destroy them by ploughing. The operation must therefore be more frequent on such and greater care taken to do it deeply and in the most thorough manner. The Double Michigan plough will be found to answer an excellent purpose on these as well as all other kinds of soil.

Toad Flax or Snap Dragon, sometimes called "Butter and Eggs" from the colour, (*Linaria vulgaris*.)—An exceedingly troublesome and pernicious weed, extending now through the Northern and Middle States. The root is perennial and creeping; the whole plant very smooth; the flowers somewhat in the form of lips, the outer part pale yellow, the palate tinged with orange, and each flower furnished with a horn or spur half an inch long. It grows one or two feet high and quite erect. It is common in many places along roadsides, fences, and in pastures. Cattle will not eat it, nor the grass it grows with. Spreading in dense patches, it soon prevents the growth of other plants. It is difficult to eradicate—the best mode is repeated ploughing and harrowing.



TOAD FLAX.

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WEEDS AND THEIR DESTRUCTION.

Horse Nettle (*Solanum carolinianum*).—A troublesome weed at the South, and extending northward. It has broad leaves, and a stem a foot or more in height; nearly the whole plant is covered with sharp spreading prickles. It has flowers of a bluish-white, and orange-yellow berries one-fourth or one-third of an inch in diameter. It is exceedingly tenacious of life, extends by the roots in patches, and nearly monopolizes the soil when it once obtains possession. Farmers in the Middle

tached to them. The stem grows two or three feet high; the flowers are numerous, in umbels, and greenish purple; the seed vessel is a follicle, opening by a longitudinal slit, the seed imbricated or placed like shingles on a roof, on an oblong fleshy center.

The milk-weed becomes troublesome on account of its running roots. Like the Canada thistle it may be destroyed by never allowing the roots to breathe through leaves. On a moderate scale, this may be done by repeatedly pulling out the young plants the moment they appear above ground; or on a larger scale by deep and repeated ploughing, followed by hand-pulling. An easier mode has been attempted, namely, starving sheep down to eating the weed, but the injury to the flock by this hard usage has been ten times greater than the cost of extirpating by hand labour.

Couch Grass, Quitch Grass or Quack Grass (*Triticum repens*).—This grass, in consequence of the great tenacity of life in its creeping roots, is extremely difficult to destroy, and is one of the most troublesome and obstinate weeds in the Northern States. When it has taken full possession, the roots form a dense stratum several inches in thickness, which is ploughed up in thick stiff masses which cannot be pulverized. The best mode of eradication is to select a time when the weather and soil are in the dryest state, and plough, harrow and rake the roots into heaps, with a spring-toothed or other horse-rake, and when dry to burn them. Repeat the operation till all are extirpated. Or the roots may be fermented and killed in layers with manure, forming compost. As every fragment of the roots will vegetate in moist soil, harrowing will only extend the evil in such soils. E. Marks, of Onondaga county, N. Y., states in a former number of the *Cultivator*, that he destroyed this grass in one season by *smothering*—ploughing it under seven times during the season, each successive ploughing being a little deeper, until ten inches was attained.

IV. SHRUBS.

Poison Sumach and Poison Vine (*Rhus Toxicodendron*).—The "Poison Vine," formerly known as the *Rhus radicans* of botanists, is now ascertained to be only a running variety of the *R. Toxicodendron*, which grows in the form of a small bush. Some persons are poisoned by it, or even by coming near it, and blisters are formed on the skin; others are wholly unaffected. There is another species, less common, but still more poisonous, the *Rhus venenata*, distinguished by its pinnate or elder-form leaves, while the *Toxicodendron* has ternate leaves or in threes. They sometimes obtain a foothold in waste ground and along



COUCH GRASS.

States should keep an eye to it, and destroy it on its first appearance.

Milk-weed or Silk-weed (*Asclepias Cornuti*).—Well known by the milky juice which flows out when it is cut or broken. It extends rapidly by its long, fleshy, perennial, branching roots, and by its flat seeds, which are wafted to great distances by means of the copious silky hairs at-

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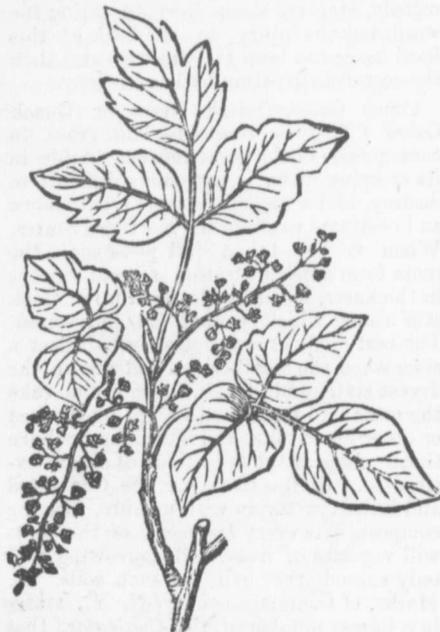


TOAD FLAX.

WEEDS AND THEIR DESTRUCTION.

fences, and should be carefully destroyed by cutting up as fast as they appear. The common sumach is another species of *Rhus*, but not poisonous to the touch.

Blackberry or Wild Blackberry (*Rubus villosus*.)—This well-known shrub often takes possession of waste ground on the land of slovenly farmers, or on newly cleared fields. Early in the season, when the leaves and shoots are tender, sheep will eat and reduce them, especially if strewed with salt; and mowing them near the ground towards the close of summer, checks their vigour. Ploughing and planting with hoed crops enables the farmer to eradicate them; but an easier and perhaps as efficient a mode is to sow to buckwheat,



POISON SUMACH.

or, better still, to corn fodder in thick drills, cultivating two or three times.

Elderbush (*Sambucus canadensis*.)—A somewhat troublesome bush along fences,

and a conspicuous indication of slipshod farming. The remedy recommended for blackberry bushes will destroy it. If the bushes are cut early in the summer, and the brush burned upon the stubs, and then all the sprouts pulled up the moment they appear, the roots will soon perish. Some attempt to root them out by digging down deeply for the roots; it is much easier to starve the roots to death by allowing no leaves to grow above the ground.

Alder (*Alnus serrulata*.)—This well-known shrub, from three to ten feet high, grows along the margin of streams and in swamps, needlessly occupying the ground. If cut closely during the last half of summer, for two or three seasons, they are destroyed.

There are other plants, both native and introduced, more or less troublesome as weeds, which might have been added to this list. But been either quite local, or less formidable in their character than most of the preceding, it is deemed hardly necessary to describe them separately, as they are all alike subject to the same general rules of extirpation, namely to prevent seeding, to destroy very young if annuals, or before seeding if perennials, to smother if creeping by the roots, and to adopt a rotation for most that shall require clean and thorough cultivation.

A disagreeable object to every farmer who has any appreciation of the neat or beautiful, or a dislike to slovenly practices, is the common throng of weeds along roadsides. There are some land-owners who are careful to keep their fields comparatively clean, who throw all kinds of rubbish into the highways, along the borders of which immediately spring up thistles, mulleins, burdocks, mayweed, nettles, clod-bur and briars, rendering the public thoroughfare, which should present an agreeable picture to every one, a disgusting and repulsive object to the eye. But, unfortunately, the evil does not end here; these weeds being entirely neglected, furnish a most abundant seeding to the neighbouring farms, and the weeds thus introduced are not easily eradicated.



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TIMBERS FOR SHIPBUILDING.

TIMBERS FOR SHIPBUILDING.

NOTWITHSTANDING that at the present day iron is more and more used for maritime construction, it is not without interest to consider that the very

timber is also required for the final fitting up of the interior details, and this is as well required in the modern iron ships as in the old style wooden ones.

In civil architecture the base of a building must offer a more massive appearance than the upper portions, of which the style varies in proportion to the purpose of the building and the amount of taste that is intended to be displayed. It is the same with naval architecture; the lower portions of a vessel require large and heavy

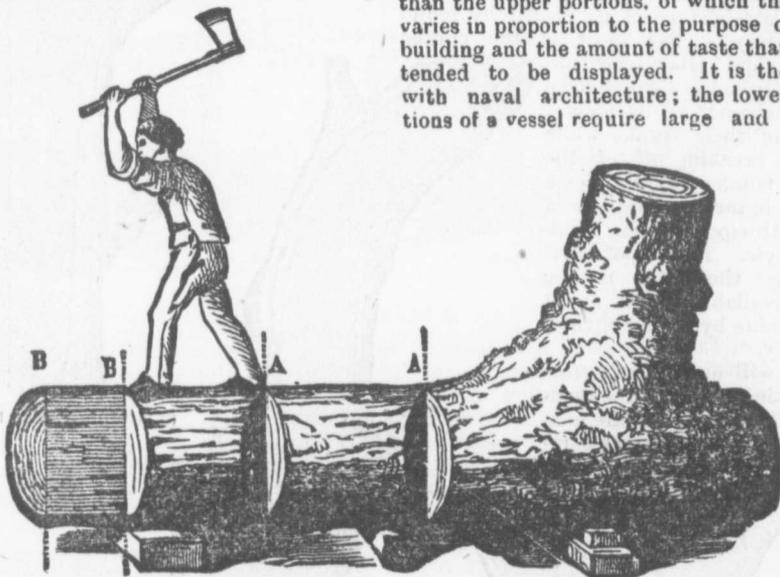


FIGURE 1.

peculiar forms of vessels, and the curves which they present in almost every portion, require pieces of timber of special shapes, such as hooks, L's, T's, S's, etc., and that timber especially suited for them is very often destroyed by the farmer who does not know its value. These curves must possess definite angles and roundings, also have certain dimensions, and these united conditions restrict considerably the choice of a material by the superintendents

timber while the upper portions, on the contrary, only receive wood of comparatively small dimensions.

The difficulties are still increased for the

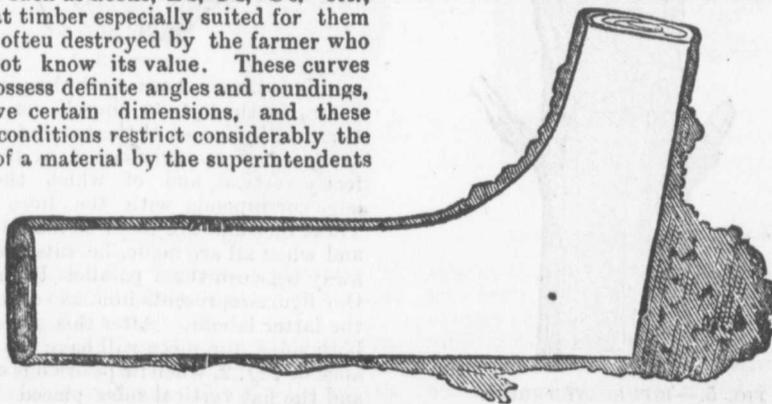


FIGURE 2.

of the shipyards. It is, however, not only very heavy wood that is largely needed for shipbuilding; in the construction of every vessel a very large amount of small

reason that all the timber of the right shape and large size must be perfectly sound, without the least fault. Experience has shown that the quality of the ground and

TIMBERS FOR SHIPBUILDING.

climate, and other circumstances accompanying the vegetation, have a great influence on the timber. Trees from a constantly wet soil are soft and porous; they grow very rapidly, but the knots are always bad, and the time of their duration in the vessel is very limited, as they soon become warm and rot. Very old trees are always of doubtful quality, and also subject to early decay. Some trees are infiltrated by water, others have a twisted bark, which indicates that their woody fibres do not run parallel, and they must all be rejected.

The straight pieces are plentifully found in the trunks, but most of the curved pieces and elbows are obtained from trees which have been exposed to accidents, bending their trunks while young, breaking off of the top of trunks whereby some side branch obtained a strength equal to the trunk itself, etc. It is not surprising, therefore, if the most available pieces are of high value by reason of their scarcity.

We will now say a few words in regard to the manner in which trees are converted into timber for shipyards, so as to produce pieces of available shapes.

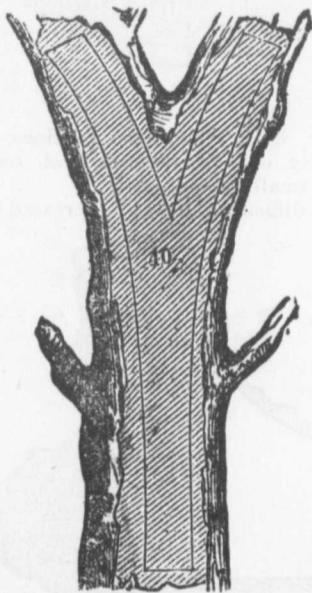
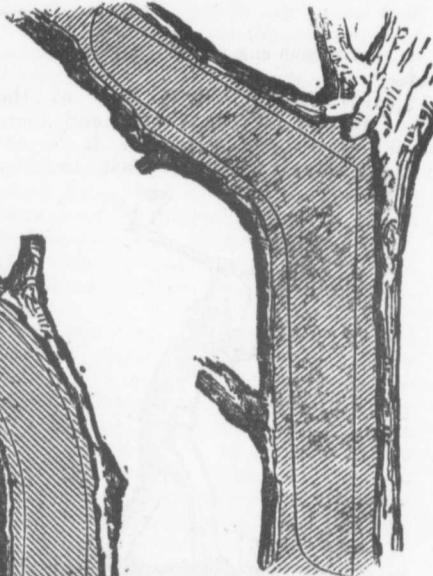


FIG. 5.—BIFURCATED JOINT.

The tree is first sawn into pieces of the desired length, among which there will be curves, S shaped, elbows, etc. In order now to square an elbow, for instance, it is

placed on saddles, in the position represented by Fig. 1, so that the curved end is upward. Once well fixed in this position, the workman marks over the wood two lines by means of a twine, which de-



ELBOW OF 130°. FIG. 6.



FIGURE 3.

termines the thickness that the piece must have; he then places himself on the timber, and by means of the hatchet makes at every side deep incisions, A A, B B, perfectly vertical, and of which the upper edge corresponds with the lines drawn. These incisions are about 20 inches distant, and when all are made, he cuts the wood away between them parallel to the fibres. Our figure represents him as commencing the latter labour. After this is done at both sides, the piece will have the appearance of Fig. 2, when its position is changed, and the flat vertical sides placed horizontally, when the workman, by means of a strong swivel and square, draws the perfect profile of the piece as complete. He then repeats the operation of making the inci-

sions as before drawn, and cut them, when the piece S (Fig. 3), in the same manner, such a way that the other dow



incisions A A between removed when the finished, and the piece inserted in Fig. furcated piece the upper part



FIG. straight line : an angle of 80° at an angle of It is evident creasing difficult for shipbu ber for shipbu ing wants of c ing increasing c ation, while t the forest by t and the more

TIMBERS FOR SHIPBUILDING.

sions as before, until they touch the line drawn, and cuts away the wood between them, when the piece is finished.

When the piece has the curve of the letter S (Fig. 3), it is treated in absolutely the same manner, placed on proper saddles in such a way that one end sticks upward and the other downward (see Fig. 4), the in-

by extensive forest fires, hasten the approach of the period when wood will no longer be available, while a scarcity has already commenced. Fortunately bountiful nature has provided for this emergency by storing up inexhaustible supplies of an ore which for thousands of centuries has been waiting for the hand of industria-

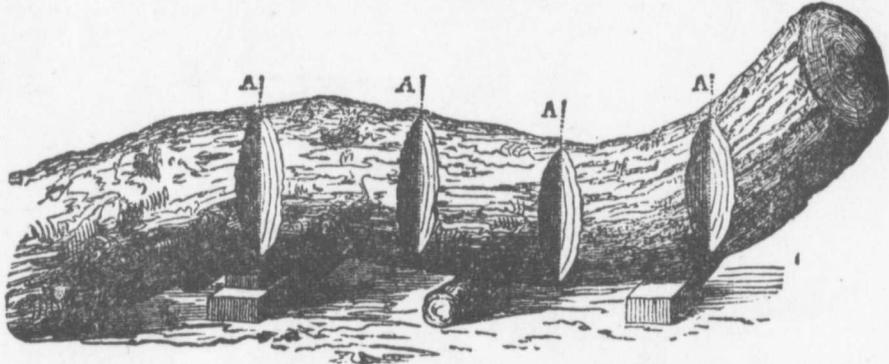


FIGURE 4.

visions A A A are made, and the wood between removed. This is done at both sides, when the finished sides are placed horizontally, and the lines marked out as represented in Fig. 3. Fig. 5 represents a bifurcated piece; Fig. 6 an elbow, of which the upper part deviates about 50° from the

human races to be converted into a metal far surpassing wood in its useful qualities for the purpose in question—namely, iron. Unlike wood, in the manipulation of which much hard manual labour is absolutely indispensable, and most of this unadapted to be substituted by the application of machine

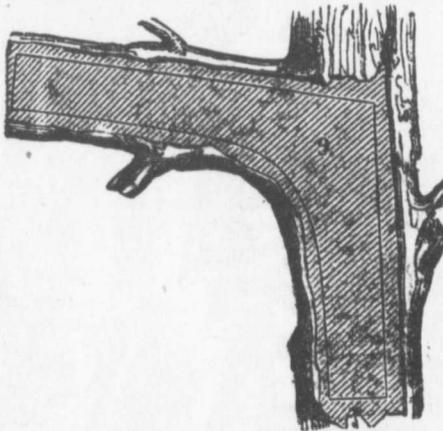


FIG. 7.—ELBOW OF 130°.

straight line: Fig. 7 where it deviates at an angle of 80°; while in Fig. 8 it deviates at an angle of nearly 130°.

It is evident that there must be an increasing difficulty in finding suitable timber for shipbuilding. The rapidly increasing wants of commerce cause a corresponding increasing demand in means of transportation, while the continual diminution of the forest by the hand of the woodman, and the more deplorable yearly calamities

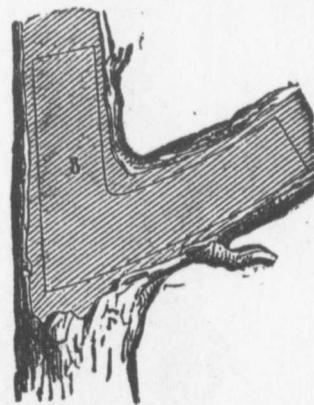


FIG. 8.—KNEE JOINT OF 50°.

labour, iron is especially fit to be wrought into every form and shape by means of machinery; so that from the instant it commenced to be used for shipbuilding, a new era in the manner of manipulating the material was at once inaugurated, and it is a secondary but by no means a small advantage that in the building of iron ships an enormous saving of time and muscle can be effected by the most liberal application of machine-power.

THE GRASSES.

THE GRASSES.

THE annual value of the grass crop in America exceeds three hundred million dollars. An improvement, therefore, effected by procuring the best sorts for sowing, or by a better system of management, that shall increase the average crop but *one-tenth*, will add to the aggregate product no less than thirty millions.

There are two ways of increasing the crop. The first is, to procure the best kind of grasses; the second, to improve the cultivation or management. A notice of some of the most valuable species, with their qualities and characteristics, may assist in promoting the desired improvement.

The number of grasses which are highly esteemed in this country, for meadows and pastures, is very few. With many farmers, timothy, red-top, and June or Kentucky blue grass, constitute the entire catalogue. There are many hundred known species, some of which, if they could be subjected to proper cultivation, would doubtless prove valuable; and the enterprising cultivator who, by undertaking the task, should introduce out of the great multitude, but one equal in value to timothy or Kentucky blue grass, would richly deserve the thanks of the whole country. The object of this brief article is to point out those of most merit which have been already tried. Its limits prevent a scientific description of the minute parts of the flower, by which alone the numerous species are accurately distinguished from each other. The cuts which are given are correct representations of the most valuable kinds, and, carefully observed, with a little additional description, will enable the reader to recognize them at once.

There are a few general terms that every one should understand. For example, the head of wheat, barley, rye, or timothy grass, growing in an oblong, compact form, is termed a *spike*; and the loose and spreading head of oats, and June grass, is called a *panicle*. The *spikelets* are the small spikes on the panicles, often consisting of several seeds and chaff, as in the chess plant, where the spikelets are about an inch long, and often hold a dozen seed; or in the June grass, where they are only about the tenth of an inch long, and contain five or six seeds. A spike, as in timothy grass, is also composed of spikelets, but they are less distinct or more crowded together.

DESCRIPTION OF THE MORE COMMON SPECIES.

Timothy, or Herd's grass of New England, and Cat-tail of Britain—Phleum pra-



TIMOTHY.

tense. (The Herd's grass of Pennsylvania and the Southern States is the Red-top, wholly different from this.) The cut affords an accurate representation of this grass when in flower. The root is perennial, and often slightly bulbous. This is

THE GRASSES.

probably the most valuable of all cultivated grasses, and especially so for hay. It is rather coarse and harsh if left uncut too long, but mown when in blossom, or immediately after, it constitutes excellent fodder. Another advantage of cutting rather early is the after-growth, which is tardy and scant if the seeds ripen. The chief objection to this grass is the want of a good second crop; but when sown with clover, the latter supplies the deficiency, and when, in a year or two, the clover disappears, June grass often comes in and is a valuable successor, where pasturage is the object. It succeeds best on rich and rather moist soils. It is an admirable crop for reclaimed marsh or swamp. At least one peck of seed is sown by good farmers, per acre, and a larger quantity will give a heavier crop, and softer and finer hay. It may be sown as a crop by itself, either in autumn or early in spring, and brushed or very lightly harrowed in. If early in autumn, it will give a good crop the next year: and a moderate or fair one the same season, if sown in spring. Three tons of hay to the acre, when plenty of seed has been used on fertile land, are not rare. It gives a large product of seed when allowed to ripen, varying from ten to twenty bushels per acre.

This grass has been called Herd's grass, from Herd, of New England, its supposed discoverer; and Timothy, from Timothy Hanson, of Pennsylvania, who largely cultivated and introduced it to notice. Who will introduce another grass of equal value, from the hundreds of wild species?

English Bent or White-top—*Agrostis alba*—resembles Red-top in general growth, but differs in having a light green and sometimes faintly purple panicle, and by the roughness of the sheaths of the leaves. It is of little or no value. A variety known as the Fiorin grass—*A. alba*, (var. *stolonifera*)—was once in high repute, but it is now regarded as little else than a weed, difficult to eradicate, on account of its rooting recumbent stems. It grows in wet places.

There are several other species of *Agrostis*, but they have not been found valuable.

Blue Joint grass, or Canadian Reed grass—*Calamagrostis Canadensis*—much resembles an *Agrostis* in its general character; it is a large grass, sometimes growing three or four feet high. The panicles are often of a purple hue; are stiffly erect, at first contracted or narrow, somewhat resembling a spike, but afterwards more spreading. The inner chaff has a finer bristle on the back, a little below the middle. It is common on low grounds in many places, and is regarded as a valuable grass, being both nutritious and palatable. It is

said to be abundant and much esteemed about Lake Superior. It deserves more attention from agriculturists.



Meadow Fox-tail Grass—*Alopecurus pratensis*. The flowers grow in a spike, somewhat like timothy, but the spikes are shorter, and feel soft to the touch, while that of timothy is rough. The spikes appear earlier, but it grows too thin and light for hay; it makes, however, a fine early pasture. It would probably be a good mixture with other grasses in seeding down to permanent pasture. Flint says that on account of its light and bearded chaff, there are but five pounds in a bushel, and 76,000 seed to an ounce. This would be six million to a bushel, which would seed about an acre.

The floating fox-tail—*Alopecurus geniculatus*—resembles the preceding, but is later, and grows in water. It is found in wet meadows, ditches, and marshes. It is of no value, unless possibly it be for furnishing pasture on flooded grounds, where other grasses will not grow.

Cut-grass or False Rice—*Leersia oryzoides*. Flowers rather one-sided panicles, coming out late in summer, stems

two or three feet high; the sheaths of the leaves which clasp the stems are exceedingly rough when drawn downward through the hand, owing to the very small points or minute prickles pointing downwards. The general colour of the heads or panicles is a yellowish green. It grows in swampy meadows, and along the margin of turbid streams. It is a weed in the North, but is cultivated to some extent in the South, and cut as hay. It will not flourish on dry or drained land, and hence thorough draining will destroy it.

Red-top, Herd's grass of Pennsylvania,

and the South-flowers are in a spikelets are on and the whole is purple colour, growing in quan about two feet. This grass is what it is called *Fine*



on rather moist most valuable much inferior to Red-top (like June

THE GRASSES.

and the South—*Agrostis vulgaris*. The flowers are in a loose, open panicle; the spikelets are one-flowered or one-seeded; and the whole head has usually a reddish purple colour, very conspicuous where growing in quantity in meadows. It grows about two feet high. Roots creeping. This grass is widely known. In England it is called *Fine Bent*. It succeeds better

ter, and forms a dense sward over the surface, which otherwise is left bare after cutting timothy for hay. It is perennial, and makes good permanent pasture, in which it should be fed down so as to prevent going to seed, which renders it unpalatable. It is one of the best lawn grasses, and, sown with June grass and white clover, forms with weekly mowing, a beautiful green carpet. The seed is small, and four to six quarts usually seed an acre.

Orchard grass—*Dactylus glomerata*—is accurately represented in the cut, as it ap-



RED-TOP.



ORCHARD GRASS.

on rather moist soils, where it is one of the most valuable grasses, although as a whole much inferior to timothy. It is well adapted (like June grass) to sow with the lat-

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THE GRASSES.

closely crowded into nearly one cluster. It flowers earlier than timothy, or about the time of red clover, which renders it better than timothy in this respect to mix with clover. It is, however, objected to as hay, on account of its coarseness. Its great value is for pasture, and it should be kept eaten rather close for this purpose. The root is perennial, and it should be sown thickly, to prevent the irregular tussocks where thinly covering the ground. It endures drought, and no grass is equal to this for growing in the shade, whence its use in orchards, and its name. It is thought to produce more pasture per acre than any other known grass. The seeds are light and chaffy, and two bushels are required for an acre, if sown alone, it deserves more attention as a pasture grass than it generally receives.

Nimble Will—*Muhenbergia diffusa*—has a slender, branched stem, with several narrow, slender panicles; the chaff has a slender beard about a twelfth of an inch long. In Kentucky and Tennessee, it forms a pasture grass of some value, but cannot be recommended for sowing.

Sea-Seed—*Calamagrostis arenaria*. The panicle is long and close or spike-like, nearly white, leaves smooth, root (rhizoma) branching and creeping extensively in the sand. Often two or three feet high. It is not cultivated for agricultural purposes but by holding the sand on the seacoasts, where it would otherwise drift, is of great value. It has been extensively planted along the shores of Cape Cod, and has saved buildings from being buried by sand.

Fowl Meadow or False Red-top—*Poa serotina*. This grass has a large, loose panicle, and small spikelets of a reddish brown or purple cast, giving it at first glance a resemblance to Red-top, (*Agrostis vulgaris*) already described, but it is readily distinguished by having several flowers in the spikelets, (2 to 4,) while Red-top has one-flowered spikelets. It is perennial, and grows in wet meadows. Its name comes from the supposed fact of the seeds having been first scattered by ducks. It is one of the best of all grasses for wet meadows and pastures, which are occasionally overflowed, and should be mixed with other sorts for this purpose. The hay which it makes is of excellent quality, and may be cut late in the season without detriment.

Blue grass or Wire grass—*Poa compressa*—is readily distinguished by its flat stem. Its only value is on dry knolls and hill sides, where the soil is rather sterile, and where it forms rich and excellent but rather scant sheep pasture. The stems retain their colour after the seed ripens. Its hardiness, and the tenacity of life by means of its numerous creeping roots, render it a

weed in cultivated fields.

June-grass, Spear-grass, or Kentucky Blue-grass—*Poa pratensis*. The genus *Poa* comprises several valuable species, among which are the Rough-Stalked Meadow, and the Fowl Meadow, grass. All the species,



JUNE GRASS.

have panicles, and the spikelets usually have several flowers (or seeds) and are not often more than about one-eighth of an inch long. The leaves are generally quite smooth.

Rough Meadow grass—*Poa trivialis*, much resembles June grass, but is distinguished by its slightly rough stalk, and

by the panicle longer. It is not preceding, but



ROUGH

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The June grass by the minute inner chaff.

It varies in poor, it is small little resembles giant masses of great value is great perfection green all winter early pasturage

THE GRASSES.

by the panicle being rather slenderer and longer. It is not equal in value to the two preceding, but is a good grass to mix with

autumn growth has been allowed. It requires two or three years to form a perfect turf, and is not well adapted, therefore, to short rotations. Four quarts of seed are



ROUGH MEADOW GRASS.

others for seeding moist meadows, and it constitutes excellent hay.

The June grass is readily distinguished by the minute cottony hair at the base of the inner chaff.

It varies much with the soil—where poor, it is small and insignificant, having little resemblance to the dense and luxuriant masses presented on rich land. Its great value is for pasturage. It attains great perfection in Kentucky. It remains green all winter under snow, and furnishes early pasturage in spring, when a good



MEADOW FESCUE.

commonly sown on an acre. It has been confounded by some with the Blue or Wire grass of the East, (*Poa compressa*), which is of less value, and in many places is regarded as a weed; seed of the latter has been wrongly sold in market for Kentucky Blue grass.

The Annual -Poa—*P. annua*—is a small species, the stalk from four to eight inches high, and distinguished by the very light

THE GRASSES.

green hue of the whole plant. It is an annual, although the plants often survive a winter. It grows along door paths and other frequented places, it is of little or no value, and is only noticed to distinguish it from other grasses of more importance.

Poa nervata, is a rather coarse, light green plant, the leaves slightly rough, and the panicle large, spreading, and branches becoming drooping. The small chaff is nerved or striped. It may prove of value for very wet or marshy places, although not equal to most other sorts in quality. The seed grows in great abundance and is easily thrashed or gathered.

Meadow Fescue—*Festuca pratensis*. The Fescue grasses, (or genus *Festuca*) usually grow in panicles, and the spikelets have several flowers. It differs from *Poa* in not having any cottony web at the foot of the inner chaff, and in the spikelets being commonly larger, and harsh to the touch, and not soft, as the *Poa*. The chaff is frequently furnished with a sharp, bristly point.

The Meadow Fescue is one of the most common as well as valuable species. It is perennial, grows two or three feet high, and, mixed with other grasses, is valuable for pasture. The Tall Fescue resembles this, but has a larger panicle, and is of little value.

Rye Grass, or Perennial Rye Grass, or Darnel—*Lolium perenne*, grows in spikes, and the spikelets are set alternately on the wavy or zig-zag main stalk, with their edges, and not flat sides, towards the main stalk. It grows about two feet high. It has been long known and valued in England, and has been introduced into this country, but does not prove of equal value here. It is not cultivated, but has found its way into grass fields. Another species, called.

The Italian Rye-grass—*Lolium italicum*, has been more recently introduced, and is undergoing experiment, and high hopes are entertained of its value by some.

Sweet-Scented Vernal grass—*Anthoxanthum odoratum*, is distinguished from nearly every other grass by its fine perfume while drying. The panicle is contracted nearly to a spike, but in shady places is more spreading. It is of little value in agriculture, although recommended as a mixture for early pastures, and for lawns.

The Hungarian grass, or Hungarian millet—*Setaria italica*, var. *germanica*, being an annual crop, and not a grass for meadows and pastures, hardly belongs here. A brief notice may, however, be useful. There are several varieties of this species, and this is regarded as one of the best. The large compound spike is well represented in the accompanying cut. It has been

long cultivated in Hungary as grain for horses, and has been within a few years extensively introduced into this country, and is highly valued by many.

Another millet, wholly unlike this in appearance, which has been much cultivated in Germany and to so extent in England, as food for fowls, called the *Common Millet*,



RYE GRASS.

is the *Panicum miliaceum*, and has a partly drooping and much branching panicle. It has a hard yellow seed.

Indian Millet is several feet high, and is a *Sorghum*, or allied to broom-corn and Chinese sugar-cane. The *Polish Millet* is a

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THE GRASSES.

small plant with finger-like leaves and known as a *Digitaria*.

The limits of this article will admit of only a brief mention of such grasses as become weeds. The two worst, the *Chess*, and *Couch grass*, were described in the first number of the *Register*, and a brief notice given of the *Fox-tail grass*. Several species the genus *Panicum* are weeds of more or less troublesome charac-

ter remarks, "No further evidence is required to demonstrate the unprofitable condition of the land, or the miserable management of the occupant."

The Sedge grasses, of which the genus *Carex* forms the largest portion, grow mostly in wet places, and are coarse and of little value. Cattle eat them only when they can get nothing better. The sedges are eradicated by drainage and cultivation.

Of Forage plants, which are not grasses, the only ones cultivated successfully in this country, are Red and White clover. There are two or more varieties of the Red—the larger, coarser and later flowering, and the smaller, finer and earlier flowering. The latter is best for hay, the former for ploughing in as green manure. The White clover is of little value in meadows, but forms a good mixture in pastures, and is especially valuable mixed with Red-top, for lawns requiring frequent mowing.

NUTRITIVE VALUE OF HAY.

According to the experiments of several eminent European agriculturists, 100 lbs. of good meadow hay are equal to about 90 lbs. of best cured clover hay, 300 to 500 lbs. of rye straw, (varying with time of cutting, &c.,) 200 to 400 lbs. of oat straw, 200 to 300 lbs. of ruta bagas, 250 to 400 lbs. of mangold wurtzels, 200 to 300 lbs. of carrots, 150 to 200 lbs. of potatoes, 30 to 60 lbs. of beans or peas, 50 to 60 lbs. of Indian corn, 65 lbs. of buckwheat, 35 to 75 lbs. of barley, 40 to 80 lbs. of oats, 30 to 70 lbs. of rye, 30 to 60 lbs. of wheat, and 40 to 100 lbs. of oil cake

MANAGEMENT OF GRASS LAND.

The limits of this article will allow only a brief outline of the essential requisites for growing heavy crops of good grass.

The first, is a rich soil. Every farmer has observed the great difference in the crop on a poor knoll, and on a manured, fertile, or moist spot. Land laid down to grass should, therefore, be in the best order; and as most grass roots do not run deep, a surface manuring on heavy soils, or a coating turned in with a gang-plough on lighter land, would be very useful before seeding.

Thick seeding is the next requisite. Many thickly seeded fields show bare spots, which are so much loss in land. If these spots constitute a third of a six acre field, then two acres are wasted. It has been found by careful counting that a foot square of rich old pasture, composed of mixed grasses, contains about a thousand plants; and some highly enriched and irrigated meadows have contained nearly twice that number. This is 7 to 12 plants to a square inch. Now, let us see how much of the different grass seeds will give this number



ITALIAN RYE GRASS.

ter, among which may be mentioned the *P. crus-galli* and the, *P. capillare*, (or the cocks-foot and old-witch grasses;) the *Digitaria* or crab grass, which is more troublesome towards the South; and the *Andropogon furcatus* and *A. scoparius*, or Indian grass, coarse brown plants, growing in poor neglected fields, and of which Dr. Darling-

THE GRASSES.

of plants. There are in a bushel of clear seed, of

Timothy.....	40,000,000 seeds.
Orchard grass.....	7,000,000 seeds.
June grass.....	45,000,000 seeds.
Red-top.....	70,000,000 seeds.
Meadow Fescue.....	25,000,000 seeds.
Red clover.....	16,000,000 seeds.
White clover.....	25,000,000 seeds.

There are about 6,000,000, square inches to an acre; and allowing for one-third not growing, there ought to be 10 seeds to a square inch, or 6,000,000 per acre. It will be seen that this would require nearly a bushel of Red-top, and more than a bushel of June grass or Timothy. There are some grasses occupying more room; for example, a good sod of Meadow Fox-tail, six years old, was found to have about 80 plants to the foot, or less than one to each square inch; there are 6,000,000 seed of this grass to a bushel; consequently about two-thirds of a bushel would seed an acre, if all grew. Clover plants occupy as much space, and a peck to half a bushel is a good seeding.

The preceding table will show the proportions of each to take, in forming a mixture of several sorts.

The writer of this article has tried thick seeding to great advantage; from half a bushel to a bushel of mixed timothy and clover having nearly doubled the crop from ordinary qualities, and rendered it finer and softer. The coarse and harsh character of hay from new meadows would be avoided by heavy seeding.

Time and Manner of Seeding. The most common practice is to seed to grass with some grain crop. The only advantage of this is the saving of labour by sowing two crops at one ploughing. The advantage is the shading and retarding of the grass by the overgrowth of the grain. All crops dry up to the soil, by the leaves pumping up the water through the stems and scattering it to the winds. Hence, after the first germinating process, while the earth is yet wet in spring, the grain crop is detrimental. It requires more labour, but is enough better repay it, to prepare the land late in the fall, and sow grass very early in spring, with nothing else. If well seeded on rich soil, the young plants will quickly spring up, and soon be out of the reach of drouth. It will make a good crop the first year. If not sown quite early it will be likely to fail. Or, for any hardy grasses, an equally good and perhaps better time is early in autumn, after a grain crop has been harvested from the land. If the autumn is moist, it will make a good growth before winter, and bring a heavy crop next year.

Depth of Burying. Much seed is lost by want of moisture and no covering, and

much by burying too deep with the harrow. By careful experiments it appears that most of the common species of grass grow best when covered not over one-fourth of an inch deep; at a depth of about three-fourths to one inch only one-half grows; and nearly all kinds, including red clover, fail when buried two or three inches. The

character of the soil would make much difference; for example, seed might be buried nearly twice as deep on light sandy as on strong loams. Seed sown on smooth mellow ground, and rolled, will generally be covered from a quarter half an inch, and will succeed well if not followed by drouth. On light and thin soils, a fine harrow, made of many large cut nails, driven through plank, sloping backwards, will do good service. Nothing is better to make seed "catch," and start the young grass speedily, than a top dressing of rotted manure or fine compost, just before seeding.

Old and New Seed. Grass seed two or three years old is comparatively worthless; yet there is no ready way to detect it. The temptation in dealers to mix old with new, is no doubt sometimes great. The best way to test it, is to sprinkle the seed evenly and thinly between folds of cloth, and keep these constantly wet, but not soaked, and in a warm place, for a few days. If all or nearly all, will sprout, the

seed is evidently of the best quality; if they are plump and only half germinate, it will lead to suspicion of mixture. In this case, twice the usual quantity should be sown.

A mixture of different species, always produces more grass, especially in pastures,



VERNAL GRASS.

than only one fill the interstices roots descend to the soil more turf.

Top-dressing autumn greatly soluble parts of soil and enrich from cold wind



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as a mulch the product of grass repeated top-d Irrigation, v always advant

THE GRASSES.

than only one or two sorts. The smaller fill the interstices among the larger; the roots descend to different depths, and enrich the soil more equally by the supply dense turf.

Top-dressing with manure or compost in autumn greatly improves all grassland, the soluble parts of the manure wash into the soil and enrich it—it protects the roots from cold winds and exposure—and serves



HUNGARIAN GRASS.

as a mulch the succeeding summer. The product of grass fields has been doubled by repeated top-dressings.

Irrigation, where it can be practised, is always advantageous. Flooding grass lands

with muddy water early in spring, by passing swollen streams over freshly ploughed loam, has greatly increased the crop. It effects a fine, even mulching of the plants, more perfectly than any other process can accomplish.

Feeding close in autumn, exposes the roots to cold winds, which checks their early growth in spring, while a good coating of grass serves as an excellent protection, and favours an early and abundant crop. Pastures or meadows which have been closely fed, will be greatly improved and saved by a top-dressing of litter or of compost, applied in autumn.

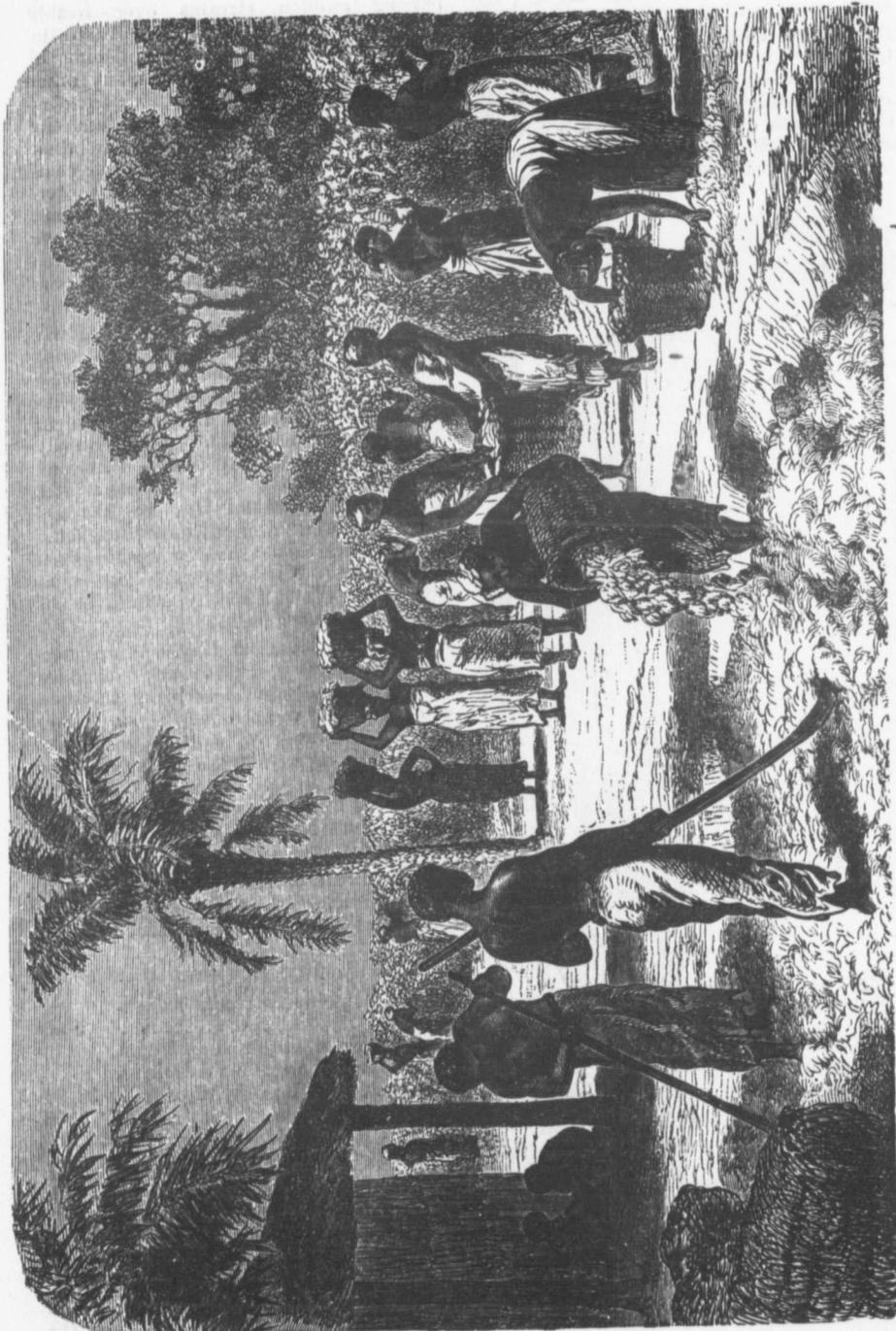
Time of Cutting Grass for Hay. Early in its growth, grass is watery; as it approaches blossoming, the amount of sweet nourishing juice increases after blossoming; and as the seed ripens, the sugar diminishes, and the hard woody fibre increases. The best time, therefore, generally is to cut within a few days after the principal portion of the crop has appeared in flower. For milch cows it should be cut a little earlier than for working oxen and horses. Hard stemmed grasses, as Orchard grass and Timothy, should be cut earlier than softer sorts.

Expence of Making Hay. When meadows were cut by scythes, and raked by hand-rakes, the cost of securing the crop was computed to be one-half its value. Now, by the use of mowing machines, horse-rakes, horse-forks, &c., it need not be one-fourth, as the following estimates for cutting fifty acres will show:

Interest on \$100, cost of mowing	\$7 00
machine.....	3 00
Wear and tear, annually, say.....	20 00
Team and man, 8 days, 6 acres per day, (a low estimate,).....	30 00
Cost of cutting 50 acres.....	
Raking, horse and man, 20 acres a day.....	5 00
Drawing, if 2 tons per acre, 2 men and 1 team; with horse-fork, 8 tons daily, \$3 per day, 12 days..	36 00
Contingencies, rain, &c., say.....	7 00

Cost of securing 100 tons..... \$78 00

Or, 78 cents per ton. It will be observed, however, that the team of the farmer stands idle much of the time in harvest, and that the actual cost, as compared with the old way, would therefore be really less. Where the hay is secured in stacks or in hay-barns situated contiguous to the meadow, the use of the hay-sweep in connection with the horse fork, would probably enable two or three men and two boys, with three horses, to draw and pack away *thirty tons a day or more*. The hay-sweep is but lit-



COTTON HARVEST IN BRAZIL.

THE cutting and the subsequently, terminating the domestic animal prevailing ignorance as of the habits to resist all into general valuable young poses, nevertheless against imposition in pedigree, which of much importance published records



ledge of the mouth of the age, must need and importance

The following result of investigation Furstenberg, drawings are first in an article *deutsche Land*

[REMARKS. - as the following parts divested soft tissues, and their absence. appearance and represented in living animal, the space which and which, on one-third of the teeth, measured at the surface whose length of the mouth do the teeth

THE AGE OF THE PIG.

THE AGE OF THE PIG.

THE cutting of the teeth, their shedding, and the aspect of the mouth of the pig subsequently, are as valuable aids in determining the age of this as of other domestic animals. But on account of the prevailing ignorance in this matter, as well as of the habitual inclination of the animal to resist all handling, this method of ascertaining the age of swine has not come into general use. In the selection of valuable young animals for breeding purposes, nevertheless, as well as to guard against imposition (or fraudulent representation in connection with the matter of pedigree, which, of late years, has become of much importance, on account of the published records of the same), a know-

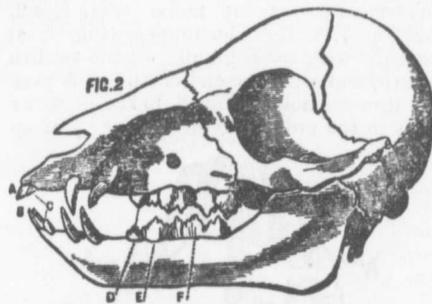


ledge of the changes that occur in the mouth of the pig at different periods of its age, must necessarily be of practical value and importance.

The following description embodies the result of investigations made by Simmonds, Furstenberg, and H. V. Nathusius. The drawings are by Furstenberg, and appeared first in an article by him in *Zeitschrift für deutsche Landwirthe, Jahrgang, 1855*.

[REMARKS.—It must be remembered that, as the following engravings represent the parts divested of the gums and all other soft tissues, allowance must be made for their absence. Thus, in comparing the appearance and length of the teeth as here represented in natural size with those of a living animal, allowance must be made for the space which the gums would occupy, and which, on an average, would be about one-third of the length of the fully-developed teeth, measured from the base of the teeth at the surface of the jaw-bone. The tusks, whose length exceed that of the other teeth of the mouth, make an exception, and so do the teeth not fully developed, so that

the average thickness of gum which covers the base of the fully-developed teeth must be deducted from the length of the former. For practical purposes, the drawings would, of course, have been more useful if they had represented the jaws not divested of the gums; as some of the teeth which are visible in the skeleton are not yet visible in the mouth of the living animal at the ages represented. For instance, the intermediate incisors, which, in the jaws of the four-weeks-old pig (Fig. 2, c), are very cor-



rectly represented as considerably developed, are not visible above the gums before the third month after birth; and the third temporary molars, which, in the drawing, correctly measure one-eighth of an inch in length (Fig. 2, d), will only be visible through the mucous membrane of the gums between the fifth and sixth week after birth—PAAREN]

According to usage, the teeth are classified in two groups—the incisors and the molars (*molars*).

The full-grown hog has twelve incisors, or front teeth, six in the upper, and six in the lower jaw. The incisors in each jaw are divided into two halves, three on each side of the median line, of which the foremost (Fig. 8, e e) are called the nippers; the next outside of these (Fig. 8, f f) are called intermediary incisors, and the remainder, outside of these again (Fig. 8, g g), are called corner incisors.

There are seven molars in each side of the upper and lower jaw, making twenty-eight; and to facilitate description each row is divided into three sections.

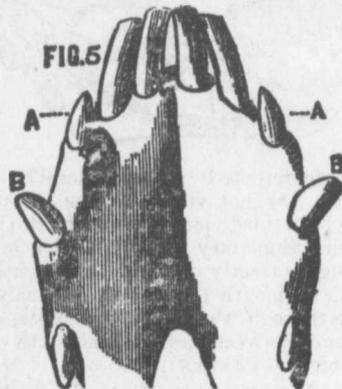
Each of the three hindmost molars in the four rows appear at different periods of a later age, and are permanent teeth (not preceded by milk teeth.) The three next in front of these appear soon after birth, one after another. They are called milk teeth and are in the course of time shed, one

THE AGE OF THE PIG.

length, they will present an evenly rounded front (Fig. 4b); but soon afterwards the edges of their crown begin to wear on, first on the nippers, and afterwards on the intermediary incisors.

At the sixth month of the pig's age, the so-called wolfs-teeth (Fig. 4, a) break through the gums. In the lower jaw these are located close behind the tusks, but in the upper jaw they are nearest to the third premolars. At this age appear also in each jaw the first of the permanent molars (Fig. 4, c, and Fig. 8, a 3).

The milk teeth are shed in the same order in which they have appeared. The shedding of the corner incisors and the tusks takes place shortly before or during the ninth month, and at the same time appears the second permanent molar (Fig. 8, a 2, and Fig. 7, b 2). The nippers (Fig. 5, a) are shed with the beginning of the twelfth month, and with the end of the first year the three premolars (Fig. 8, b) are shed, exactly in the order in which they first ap



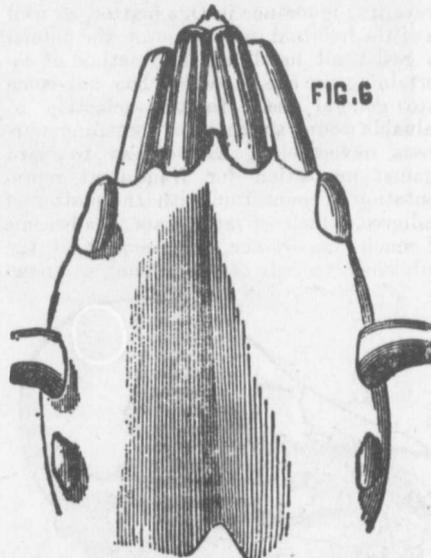
peared. The cutting surface, or crown, of the permanent teeth filling their places (Fig. 7, a), will, at the age of fifteen months, be on a level with that of the permanent molars (Fig. 6, b.)

[REMARKS—By comparing the temporary intermediary incisors in Fig. 6 with the two permanent nippers between them, the difference in shape of a temporary and a permanent incisor will be apparent. In Fig. 8, where the permanent intermediary incisors have succeeded the temporary ones, it will be seen that they are now of the same peculiar form as the permanent nippers between them.—PAAREN]

The intermediary incisors (Fig. 8, f f) will, at the end of the eighteenth month, have been succeeded by permanent substitutes; and simultaneously with this change appears the last of the permanent molars (Fig. 8, a 1.) This tooth is composed of three principal parts, which again appear to be made up of smaller parts, and the

grinding surface of the tooth is considerably rugged. After a while, when the surface of the tooth meets with that of its mate in the upper jaw, the ruggedness of both soon wears away, and its surface will be smooth and level with that of the other molars.

The second and third of the permanent molars (Fig. 8, a 2, 3) are the most worn, because of their constant use after their appearance, between the sixth and ninth months, while the permanent premolars



only appeared after the twelfth month, and the last permanent molar only appeared at the end of the eighteenth month.

After the age of twenty-one months, when the incisors are fully developed, they begin soon to show the effect of wear, especially those in the lower jaw, which gradually become shorter. The wear of these teeth depends somewhat on the manner in which the animals are kept. Thus, if compelled to rusticate in the woods, or if their existence depends on "root hog or die," they will wear off quicker than when the animals are provided with liberal food, and kept within limits. Therefore, the degree in which the incisors are worn can be no sure criterion of the animal's age after it is full grown.

The cutting surfaces, or crowns, of the fully-developed incisors do not only vary considerably in size and shape, but the incisors of the upper jaw differ in their form from those in the lower jaw, on account of their different position in the jaw. While the incisors of the upper jaw have a vertical direction (Fig. 9, a), those of the lower jaw are slanting, with a tendency to a horizontal direction (Fig. 9, b).

Next to their length judging the the boar. of the length ous breeds, in development stronger or common or are in the i swine. The

or accidental or diminish t For instance, direction, wh those of the t lower jaw, a and wear of the animal m Thus, an unri finement in t pecially when

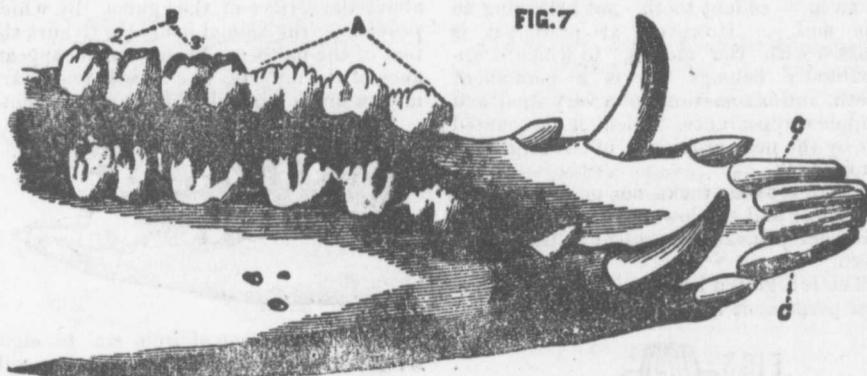
a constant sta foaming and i his tusks soon a boar of the tion, or other however, not means of del Indeed, on ac is sometimes grown hog, w mouth, the tu

THE AGE OF THE PIG.

Next to the shedding of their tusks, their length is often regarded as a guide in judging the age of swine, especially that of the boar. However, by careful comparison of the length of the tusks of hogs of various breeds, it has been ascertained that their development is not the same, but that they are stronger or more prominent in hogs of common or mixed breeds than they are in the improved or finer breeds of swine. Then, again, external influences,

the only accessible means by which we can determine the age of the animal.

It has already been mentioned that the permanent incisors and molars at the age of a year and three-quarters have reached their full development. This is, however, not the case with the permanent tusks of the boar, as these continue to increase in length and volume up to the age of two and a half to three years. The tusks of the lower jaw are longer than those of the up-

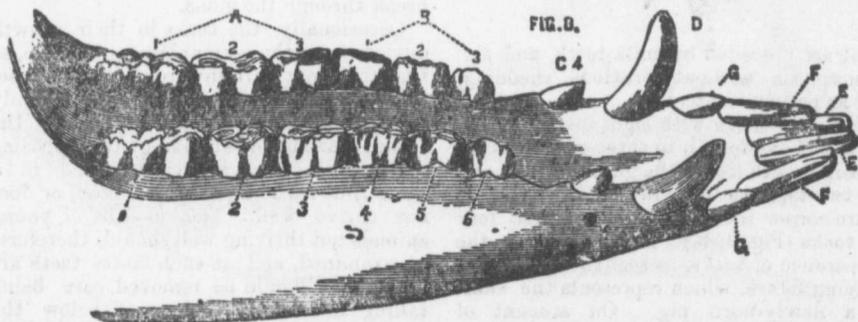


per jaw, and are turned backwards. The annexed figure shows the position, shape and size of the incisors and the tusks in both jaws of a three-year-old boar.

or accidental circumstances, may promote or diminish the development of the tusks. For instance, a deviation from their normal direction, which often happens, may cause those of the upper jaw to meet those of the lower jaw, and cause a constant friction and wear of both. The temperament of the animal may also affect his development. Thus, an unruly boar, kept in close confinement in the neighbourhood of sows, especially when these are in heat, will be in

per jaw, and are turned backwards. The annexed figure shows the position, shape and size of the incisors and the tusks in both jaws of a three-year-old boar.

The next following natural-size drawing (Fig. 10), represents the left side of the lower jaw of a ten-months-old pig. A portion of the bony wall is removed, with a view of showing the relative position of the temporary molars and the dental papillæ, from which the permanent teeth develop ;



a constant state of excitement, and, by his foaming and incessant champing, will wear his tusks sooner, and thus appear older than a boar of the same age of a quiet disposition, or otherwise kept. The tusks should, however, not be discarded as an auxiliary means of determining the animal's age. Indeed, on account of the difficulty which is sometimes experienced in handling a grown hog, with a view of examining its mouth, the tusks and incisors often become

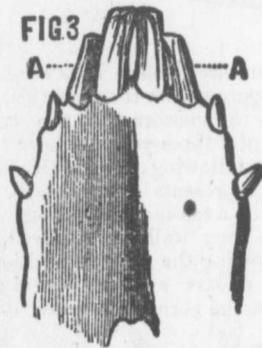
also, the extent of space occupied by the roots of the other teeth. The dental papillæ, also called dental pulps (4, 5, 6), are already, at this age of the animal, considerably developed. The cause of the diminutive size of the wolf's tooth (a) will be understood by noticing the position and size of the root of the adjoining tusk (b.) The comparatively small size of the corner incisor (c) is likewise due to the limited space allotted to it, by being

THE AGE OF THE PIG.

after another, in the order in which they appeared, to give place for three permanent molars. These six molars are counted from the hindmost one forward (see 1 to 6 on Fig. 8, which represents, in natural size, a portion of the lower jaw of a full-grown pig.) The seventh molar tooth, or the fourth premolar (Fig. 8, c. 4), appears later, in the space between the third premolar and the tusk. This small, apparently supernumerary tooth is sometimes called a wolf's tooth, and was formerly considered as an independent tooth, not belonging to the molars. However, at present it is classed with the molars, to which it undoubtedly belongs. It is a permanent tooth, and is sometimes of a very small and crippled appearance, which is accounted for by the near proximity of the large and strong tusk.

There are four tusks, one on each side of the upper and the lower jaw, (Fig. 8, d.) Temporary tusks are present at the time of birth.

The full-grown hog has thus in all forty-four permanent teeth, of which twenty-



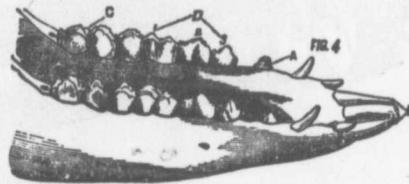
eight are preceded by milk-teeth, and sixteen appear without previous shedding, and as permanent teeth.

The pig is born with eight teeth, which are about one-fourth to three-eighths of an inch in length above the gums. Of these, the two foremost ones in each jaw (Fig. 1, a) are corner incisors, and the other four are tusks (Fig. 1, b.) They all have the appearance of tusks, as seen in the accompanying figure, which represents the skull of a newly-born pig. On account of their outward direction, these teeth do not hurt the teats of the sow, as is sometimes supposed. [They are occasionally even blamed for being the cause of the sow devouring her young soon after birth; but this supposition is groundless.] They appear to be of no other use to the young pig than to steady the tongue, and thus in a manner assist in holding the teat.

In the course of eight to fourteen days after birth, there appear, through the

mucoous membrane of the gums, the second and the first of the number of premolars, on each side of the upper and lower jaw, and which from the time of birth have been concealed immediately under the gums.

Four weeks after birth, the nippers cut their way through the gums, in the upper and the lower jaw (Fig 2, a b), so that the young animal at this age has eight incisors, four tusks and eight molars. The nippers, after having cut through the gums, remain for some time stationary, about half a line above the surface of the gums, by which provision the animal is unable to hurt the teat of the mother. Soon after the appearance of the nippers, the third temporary molars break through the gums in both



jaws, and at the age of from six to eight weeks, these, as well as the nippers, will have so far developed, that the young animal is able to subsist independent of the mother.

From the above, it will be understood that the young pig, at the age of four weeks, is able to begin to chew solid food, and that such food may then be given to it. It will be proper, at this time, to give the animal some hard food; such as oats or barley; also to throw before it small pieces of chalk or soft coal, the chewing of which substances will cause the teeth sooner to break through the gums.

Occasionally the tusks in their growth deviate from the normal outward course, so that they may turn inwards. In this case, the young animals often cry out suddenly from pain, occasioned by the points of the tusks bruising or wounding the opposing gums while they are eating, and in a short time such a pig grows poor, or does not thrive well. The mouths of young animals not thriving well should, therefore, be examined, and if such faulty teeth are found they should be removed, care being taken not to break them off below the gums, as that might prove equally injurious to the animal.

At the age of three months appear the two intermediary incisors in each jaw (Fig. 3, a, a), and with these all the milk teeth are present.

With advancing age the size of the teeth increases, so that by the age of six months their maximum size will have been reached. As soon as the four middle front teeth of the lower jaw have reached their full

wedged in tusk and which latter occupies a very large space. The third permanent molar is just developed, which is just above the papilla (the papilla of the molar is clear state of development of the papillae of the



intermediary incisors are present in the

As a rule, the young pig exceeds with the cutting, the hardness of the animal.



Furstenberger tabular summa the age of six months. The animal has its corner incisors

On the eighth day the second and third

At four years

THE AGE OF THE PIG.

wedged in between the large roots of the tusk and the intermediary incisor (d), which latter, together with the nipper (e), occupies a very slanting position in the jaw. The third permanent molar (3) is fully developed, while the second permanent one (2) is just appearing, and the position of the papilla (1) of the last of the permanent molars is clearly shown in a far-advanced state of development, as are also the papillæ of the permanent nippers and the



intermediary incisors, but yet deeply imbedded in the jaw.

As a rule, the shedding of the teeth proceeds with the same degree of regularity as the cutting, so that irregularity or backwardness only occurs in crippled or sickly animals.

(Fig. 2, a b) appear ; two in the upper, and two in the lower jaw.

At the fifth or sixth week, the foremost temporary molars appear in the upper and lower jaw (Fig. 2, d).

At the age of three months, the intermediary incisors (Fig. 3, a a) have appeared above the gums.

At the sixth month, the so-called wolf's teeth (Fig. 4, a) will have appeared ; and at the same age appear the third permanent molars (Fig. 4, c).

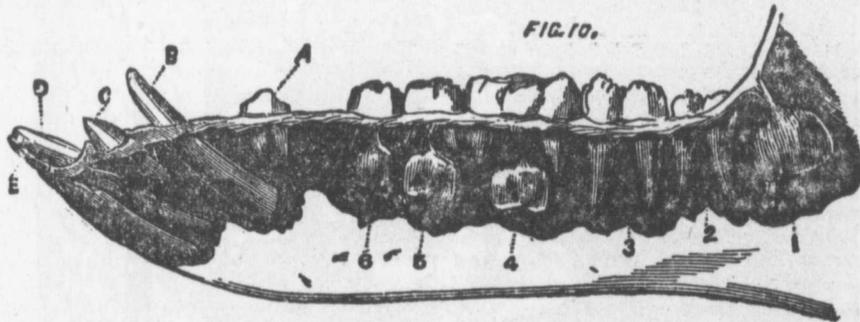
At the ninth month the following teeth will have appeared ; namely, the permanent corner incisors (Fig. 5, a), the permanent tusks (Fig. 5, b), and also the second permanent molars (Fig. 7, b 2).

At the twelfth month, the permanent nippers (Fig. 6, a) will be in view.

With the twelfth and thirteenth months, the three temporary molars will have been shed, and their permanent substitutes, which, after fifteen months of age, will have fully appeared (Fig. 8, b), are now just cutting through the gums.

With the eighteenth month, the permanent intermediary incisors (Fig. 7, c), and the hindmost permanent molar (Fig. 8, a 1), will have made their appearance ; and, with the twenty-first month, they will be fully developed.

[REMARKS.—During the time intervening between the tenth and the eighteenth month of the animal's age, the jaw-bone, by process of further development, will



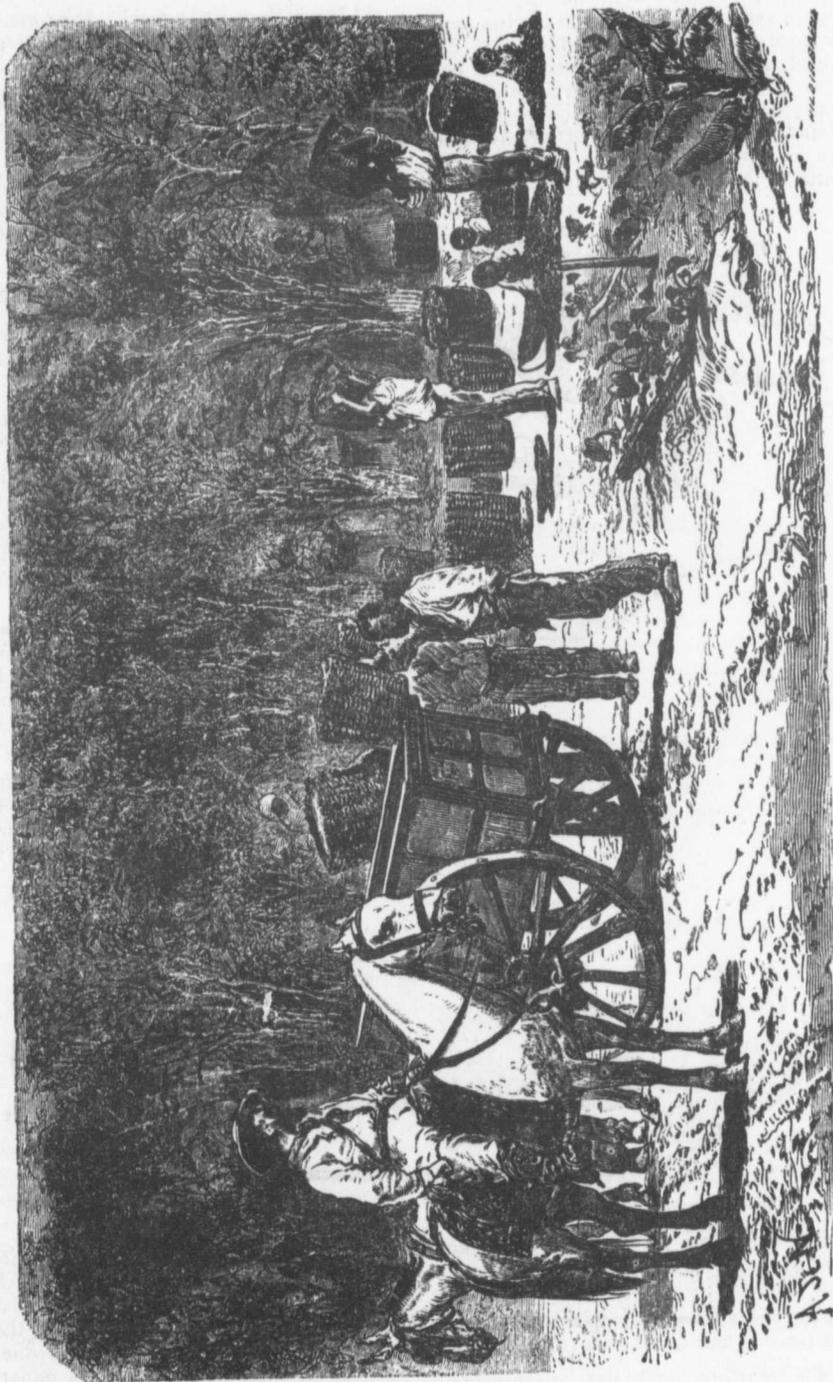
Furstenberg has given the following tabular summary as a guide to determine the age of swine :—

The animal is born with eight teeth—four corner incisors and four tusks (Fig. 1, a b).

On the eighth or tenth day appears the second and third temporary molars (Fig. 2, e f).

At four weeks old, the four nippers

gradually assume such a shape that its present slant, at the place to which the papilla of the coming molar now points, will be on a level with the portion of the jaw now occupied by the other teeth ; so that the last permanent molar, on its appearance, will occupy a position similar to that now occupied by its neighbour, as may be seen by reference to Fig. 8, a, 1.—PARRÉN.



COFFEE HARVEST IN BRAZIL.

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INSECTS WHICH INJURE GRAIN CROPS.

THE wheat midge (*Cecidomyia Tritici*, Kirby), the insect which in this country is commonly but most improperly termed the "weevil," is by far the most important depredator upon our grain. It has been known in Great Britain for more than a hundred years, and has occasionally been quite injurious to the wheat crops of that country. Within a few years past it has also attracted observation in the north part of France, in consequence of the damage it was occasioning in the wheat crops there. In these its native haunts, wherever it appears, it is accompanied by vast numbers of minute black flies, resembling small ants, which are its parasitic destroyers. One of these parasites deposits its eggs in the larva, another in the eggs of the midge, causing them to perish, and hereby this insect is constantly repressed and restrained from multiplying, and is speedily quelled whenever it chances to become numerous.

It was introduced upon this continent, probably, in unthreshed wheat brought to the port of Quebec, and began to attract public notice from its extreme destructiveness to the wheat crop in the north-western part of Vermont, in the year 1828. From thence it has spread itself over all the free States and Canada, as far west as into Michigan and Indiana, everywhere laying the wheat under contribution for its support, and rendering this crop so uncertain that in all the older parts of the country it has ceased to be a staple product.



Fig. 1.—WHEAT MIDGE, FLYING.

This insect is a very small two-winged fly about a third the size of a musketo, which it resembles in its appearance. It is

of a bright lemon-yellow colour, with clear, glassy wings. In the annexed cut (fig. 1), it is represented as it appears when flying, the small figure underneath showing its natural size; and the following figure (fig. 2) shows it with the wings closed over its back, as it appears when standing or walking about upon the heads of the wheat. It is the female which is here



Fig. 2.—WHEAT MIDGE making but twelve joints in WALKING. this sex, each of these joints being encircled with two whirls of hairs.

The males are smaller, with antennæ much longer and more slender, and so different in their structure that the two sexes are readily distinguished hereby. In the male there are twenty-four globular joints, in pairs, each alternate two joints being placed perceptibly nearer together; in the female, these two joints are united into a single oblong joint, thus being encircled with two whirls of hairs. These flies come out from the ground each year in the fields where wheat was grown the year before. The sexes pair immediately, and the females then fly away by night in search of the new wheat fields, in which they all soon become gathered. It is a little before the middle of June that they begin to appear, and the females continue more than a month, occupied in placing their eggs between the chaffs of the wheat ears. They are most active in a moist atmosphere, and cannot endure a dry one. Hence they are only seen at their work on the wheat ears in the night time, when the dews are falling, and on cloudy days. And if the last half of June be wet and showery, this insect is most numerous and destructive; but if it be remarkably dry, the wheat that year escapes from injury, the insect withdrawing from it, probably to the grass of moist lowland meadows and the margins of streams, in which to rear its young, to return, as they do, into the wheat of the next year.

The eggs, two of which are represented in fig. 3, as they appear when highly magnified, hatch minute footless worms, or maggots, which soon acquire a bright orange-yellow color. These place themselves upon the soft young kernels of the grain as seen (fig. 4), which represents a kernel of grain with its chaffs or husks

INSECTS WHICH INJURE GRAIN CROPS.

opened apart to show these yellow worms clustered upon it. They abstract the milky juice from the kernels, whereby the latter become shrunken and dwarfish. The worms get their growth in three or four weeks, when they are slightly less than a tenth of an inch long. One of these worms is represented as it appears when crawling, and with its horns extended (fig. 5), the wheat small figure on the extreme left eggs of showing its natural size. As it

Fig. 3.—MIDGE. has no feet it can only adhere to the straw when it is wet. It then moves about upon it with ease, by contracting and elongating itself. The two ends of its body, as they appear when it is lying at rest upon a dry surface, are represented upon the right side of the same figure, the head being drawn in, so that only the ends of its horns are visible. It is when the straw is wet with rain that these worms, having got their growth, leave the wheat heads and crawl down to the ground, where, slightly under the surface, they inclose themselves in minute cocoons, scarcely the size of mustard seed, in which they remain through the autumn and winter, and till ready to change into flies the following June. A portion of the

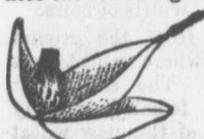


Fig. 4.—WHEAT CHAFFS OPENED, SHOWING THE WORMS ON THE KERNEL.

worms, however, are still remaining in the wheat heads at the time of harvest. These are carried into the barn, where, as no moisture gets to them to quicken them into activity, they lie dormant until the grain is threshed and cleaned, when they drop with other foul matters into the box which gathers the screenings of the fanning mill.

With respect to the remedies for this insect, every farmer knows that by late sowing he can prevent his wheat from being headed and in bloom till the season for the midge to deposit its eggs therein has nearly or quite passed by; yet, in thus attempting to raise wheat in any other except the best period of the year for its growth, he is liable to obtain only an inferior crop. It is in our power to do much towards diminishing the number of this insect. Whenever the screenings of the fanning mill abound with the yellow larvæ of midge, they should be burned, or fed under cover to the poultry or swine; they should never be emptied out doors to manure, as they there will, into a swarm of flies, to live at the expense of the wheat the following summer. And those larvæ which leave the wheat heads

before harvest, and remain in the fields, tightly wound up and fettered in their cocoons, slightly under the ground, may be destroyed, it is altogether probable, by turning the wheat stubble under with the plough—thus burrowing them to such a depth that in their effort to work their way up to the surface, when they break out from their cocoons the follow-

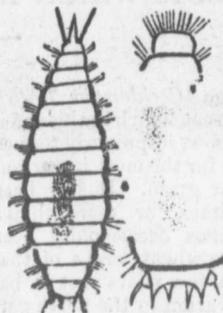


Fig. 5.—LARVA OF WHEAT MIDGE. ing June, they will become exhausted and perish. Thus every man may destroy all these insects which are generated in his own wheat, and thereby materially lessen their ravages on his lands. But unfortunately they breed also in grass, or at least in some situation other than in the wheat, from whence their ranks will always be liable to be replenished.

In America we have now had thirty years' experience with this insect. We have become well acquainted with its history, its transformations, and its habits. The best remedies for it which we are able to devise and practise, are but partially efficacious. It continues to be as numerous and destructive now as it has been at any previous period. By diminishing the yield of its wheat crops it is occasioning a loss, to the State of New York alone, of some millions of dollars annually. And this loss will continue until by accident, or by the hand of man, the parasite destroyers of this insect become introduced into this country, when it will disappear, in the same manner that its predecessor and compeer in destructiveness, the Hessian fly, has disappeared, and has almost ceased to be felt as an evil.

The Hessian Fly, (*Cecidomyia destructor*, Say,) instead of taking up its abode in the wheat heads and nourishing itself on the kernels like the preceding species, makes its attack at the root and lower part of the stalk, thus destroying not the seed merely, but the whole plant. It is an European insect, and has been detected in Germany, France and Italy, where it at times has committed severe depredations upon the wheat crops. Written accounts, which seem to point to this insect, date as far back as the year 1732. It was brought to this country, probably, in some straw used in package by the Hessian soldiers who landed on Staten Island and the west end of Long Island, August, 1776, but did not become so multiplied as to attract gen-

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Fig 6.—HE would nee parasitic ex such an ext And from t

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INSECTS WHICH INJURE GRAIN CROPS.

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Fig 6.—HESSIAN FLY. years, when they would nearly or quite cease; its parasitic enemies probably increasing to such an extent as to almost exterminate it. And from that period to the present time



Fig. 7.—LOWER JOINT OF A DISABLED WHEAT STRAW.

it has ever and anon been reappearing in excessive numbers in one district and another of our country.

The Hessian fly female is represented, magnified, fig. 6, the cross lines below the figure showing its natural dimensions. It closely resembles a musketo in its appearance, but it is a third smaller than that insect, and has no bill suitable for sucking blood. It is black, the joints of its body being faintly marked with reddish. This fly appears in the month of September, when the fall sowed wheat is but a few inches high. Its eggs resemble minute reddish grains, and are of the same appearance when magnified as represented, fig. 3. They are laid in the creases on the upper surface of the leaf. They hatch in about a week, and the minute worm crawls down the sheath of the leaf to its base at the crown of the root below the surface of the ground, where it remains, subsisting upon the juices of the plant, without wounding it, but causing it to wither, turn yellow,

and die. Fig. 8 represents, in a very perfect manner, the diseased appearance which the Hessian fly causes in young wheat.



Fig. 8.—A DISEASED AND A HEALTHY WHEAT PLANT.

Two shoots are there seen growing from the same root; that on the left erect, health and vigorous, of a deep green colour, whilst that on the right; pale, wilted and dying, swollen at the root from worms there nestled and concealed from view. The worm (Fig. 10, the upper figure of the



Fig. 9.—SHEATH TORN OFF, EXPOSING THE WORMS.

cut representing its natural size) is a glossy white maggot with a pale green cloud in the centre of its body, and indistinctly showing some fine transverse lines marking its sutures of joints. It attains its growth in about six weeks; its outer skin then dries and hardens into a kind of shell and changes to a chestnut colour, whereby it has a marked resemblance to a flax seed. Inside of this shell the white worm (Fig. 10) lies through the winter, and the following spring changes to its pupa form, (fig. 11,) in which state it only continues some ten or twelve days, when it crowds itself out of the flax-

INSECTS WHICH INJURE GRAIN CROPS.

seed case and immediately throws off its pupa cloak, and is then the fully formed fly, (fig. 6.) Thus the fly comes out again in May, to make another attack upon those shoots of the wheat which it has not already killed. The plants are at this time beginning to start up into stalks. The eggs of the fly



thus come to be placed on leaves growing higher up than before, whereby this second brood of worms become nestled at the lower joints of the straw, causing a swelling at the point where they lie, as shown in fig. 7. Fig. 9 is a view of a straw with the outer sheath broken and torn off from the central stalk to expose the worms or flax seeds where they lie, directly above the joint. By their presence the straws become weakened and bend and fall down from the weight of the heads, and by these broken straws an infested field towards harvest time may be known, it looking as though cattle had passed through it.



Fig. 11. —
HESSIAN
FLY PUPA.

The Hessian fly is everywhere followed up and destroyed by two parasitic insects resembling small ants of a black colour. One of these, named *Eurytoma destructor* by Mr. Say, but which I think pertains to the genus *Semiotellus*, is very similar to the insects represented by the following figure 12. It may in common language be designated the Larva-parasite of the Hessian fly. It ascertains where a larva or flax seed of the Hessian fly is lying, and then with its sting pierces the straw and punctures the skin of the larva and inserts an egg therein, from which a minute maggot hatches, which feeds internally upon the larva till it kills it, when, after having completed its transformations, it bores a small hole outwards through the straw and escapes therefrom. Figure 8 shows two of these holes made by parasites which had come from two flax seeds in the straw at this point. Another parasite is much smaller, and inserts four or five of its eggs in a single egg of the Hessian fly, whereby, when the larva hatches from the egg, it has these minute maggots in it, which grow with its growth, and in the end destroy it.

There being two generations of the Hessian fly each year, the one coming abroad in May and the other in September, it is only upon fall-sowed wheat that this insect depredates to any serious extent; and it can never make its appearance in those sections of the country where spring wheat exclusively is cultivated. In districts where this fly is numerous, it is scarcely possible to obtain a crop of winter wheat

except upon a fertile soil. To elude its attack, late sowing is one of the most easy and successful expedients.

There are four other insects in our country which produce a diseased appearance in the ripening grain, similar to that of the Hessian fly, namely a swelling in the stalk at one of the lower joints, and a bend at the same place, causing the straw to lean over to one side. One of these insects infests wheat, two of them infest barley, and the fourth attacks rye. The flies are of a



Fig. 12. —BARLEY AND JOINT-WORM FLIES.

shining black colour, and are closely alike in their size and shape, but may be distinguished by the colours of their legs. Figure 12 represents a female greatly magnified, the cross lines on the left showing the natural size. They appear about the beginning of June, and with their stings pierce the grain stalks in numerous places, immediately above one of the joints, inserting an egg into each puncture. This causes the stalk to swell and become of a hard, knotty, wood-like texture; and on the surface of the swelling are several slightly elevated, smooth, oval spots, like blisters. On cutting into one of these spots, a cavity or cell is there found, containing a soft pale yellowish or straw coloured maggot, much like that of the Hessian fly, figure 10. But the cell in which this worm lies is perfectly closed, being formed in the substance either of the central stalk or of the sheath which surrounds the stalk, and not in the crevice between the sheath and the stalk where the Hessian fly larva reposes. The affected stalks are stunted and backward in ripening, and if any grain is formed in the ears the kernels are small and shrunken. The worms remain in their cells in the straw till the following spring, when they become flies, and each one gnaws a small hole in the straw, like the perforation of a pin, out of which it crawls.

These insects pertain to the order Hymenoptera, and the family Chalcididae.

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INSECTS WHICH INJURE GRAIN CROPS.

They are named and distinguished from each other as follows :

The Black-Legged or Massachusetts Barley Fly (*Eurytoma Hordei*, Harris) has all the legs black, with only the knees and feet dull pale yellow. Over thirty years ago this fly for several seasons infested the barley in the northeastern section of Mas-

achusetts, rendering this crop so precarious that its cultivation was to a considerable extent abandoned.



Fig. 13.—CHINCH BUG.

achusetts, rendering this crop so precarious that its cultivation was to a considerable extent abandoned.

The Joint-worm Fly (*Eurytoma Trica*, Fitch) differs from the preceding in having the shanks of its fore legs dull pale yellow. The malady which this insect produces in wheat, began to attract notice in the central parts of Virginia fourteen years ago, and the first published accounts of it were given in the *Southern Planter* of July, and the *Albany Cultivator* of October, 1851. For several years it continued to be the greatest pest ever known to the wheat in that region, totally destroying the crop in many fields.

The Rye Fly (*Eurytoma Secalis*, Fitch) differs from the joint-worm fly in having the hind shanks as well as the forward ones dull pale yellow, the middle pair only being black. In the valley of the Susquehanna in Pennsylvania, this fly, by the injury it was doing to the rye, was exciting considerable fears last year (1861) and the year before.

The Yellow-legged or New-York Barley Fly (*Eurytoma flavipes*, Fitch), differs from the three other species in having the legs of a bright honey yellow instead of a black colour. For some eight years past this fly has been infesting the barley in Onondaga and the adjacent counties in central New-York, this being the great barley-growing district of the United States. Chiefly in

consequence of this insect the productiveness of this crop has diminished from forty to about twenty bushels per acre, and it threatens to lead to the total abandonment of the cultivation of this grain in that part of the State.

As the worms of these several flies remain in the ripened straw through the autumn and winter, nestled mostly at the lower joints, it would appear that the most practicable mode to destroy them would be, to cut the grain so high up that most of the worms will be left in the stubble of the field, and then, at some dry time in the autumn, setting fire to and burning this stubble.

The Chinch Bug (*Micropus leucopterus*, Say) is one of the greatest pests to the wheat-growers of the southern and many of the western States. It pertains to the order Hemiptera, and family Lygaeidae, and is represented in the cut 13, the small upper figure showing its natural size. To the eye it appears as a small narrow black bug with closed white wings having a black dot on the middle of their outer sides. These bugs insert their beaks into the green succulent vegetation of different kinds and

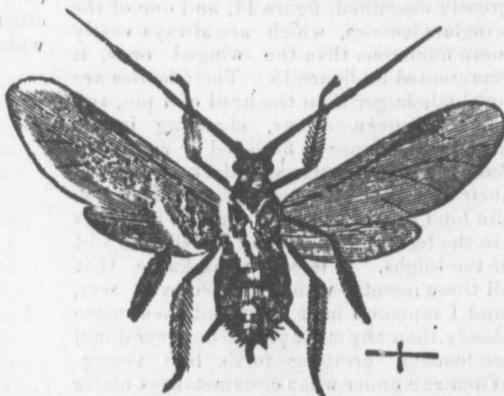


Fig. 14.—GRAIN APHIS. THE WINGED FEMALE.

suck the sap therefrom; and in such myriads do they invade the wheat-fields, that in particular spots every stalk is covered and crowded by them, and is pumped dry of its juices, causing the infested portions of a field to become of a white colour, and the kernels in the wheat ears to be shrunken and abortive. And when the wheat is harvested these bugs migrate to the nearest field of Indian corn, covering and bleaching a portion of its stalks in the same manner. It appears to be in dry seasons, particularly when two or three dry summers succeed each other, that these bugs become most multiplied and destructive. Their smell and flavour is so disgusting that the birds do not molest them, and no remedy for them has yet been discovered.

INSECTS WHICH INJURE GRAIN CROPS.

The Grain Aphis (*Aphis avenæ*, Fabricius) is a species of plant louse, insects of the Homopterous section of the order Hemiptera, and forming the family Aphidæ. It has long been known in Europe as being at times excessively numerous upon oats, wheat, barley and rye. It has been present in the grain-fields of this country for many years, but its numbers were so very few that no one ever noticed it or was aware we had such an insect here, until the summer of 1861, when, over all the New-England States and the State of New-York except its Western section, and also in the adjacent parts of Canada, it suddenly became so excessively multiplied as to overrun, and in many fields literally swarm upon and smother the growing wheat and oats. The following year it appeared in the same manner over Western New-York, Ontario, Northern Ohio, and at least a portion of Michigan; whilst through all the States where it had been so numerous the year before, it was now so greatly diminished, except in a few places, that it would not have been noticed had it not been closely looked for.

The winged female of this species is seen, greatly magnified, figure 14, and one of the wingless females, which are always vastly more numerous than the winged ones, is represented in figure 15. Their bodies are but little larger than the head of a pin, and of a grass green colour, changing in the middle of summer to flesh red or yellowish red. Their antennæ are black except at their bases; their honey-tubes or horns on the hind part of the body are also black, as are the feet and the ends of the shanks and of the thighs. It is very remarkable that all these insects which I have yet seen (and I suppose I have examined them more closely than any other person has ever done) are females, bringing forth live young. When and under what circumstances males occur, if they ever occur, is yet remaining to be discovered. No males are produced in autumn, as they are with our other kinds of plant lice, and no eggs are laid to carry this species through the winter. In autumn, when the rye and the fall-sowed wheat is a few inches high, the wingless females and their young occur, scattered about singly upon it. And in this state winter overtakes them, and they lie among the leaves of the young grain, frozen under the snow, and return to life with the warmth of the following spring. None of them have wings during the colder portion of the year. About the beginning of June the winged females begin to be produced. These fly away from the fall sowed fields to start colonies upon the spring sowed wheat and oats. As yet they are all scattered about upon the stalks and leaves.

But as soon as the heads put forth, they all gather upon them. They fix themselves upon the outside of the chaffs around their base or butt ends, as closely as they can crowd together, thus sucking out the juices which should go to swell and mature the kernels. Hereby the ripened grain is rendered dwarfish and light of weight. In the fields of spring wheat and oats which are latest in ripening, these lice become multiplied to the greatest excess, whereby but a third or a half of an ordinary crop is yielded from the fields which are the worst infested.

The grain aphis brings forth its young mostly in the night time. The rapidity of its multiplication is truly astonishing. I find the winged females usually produce two and the wingless ones four young ones each night, and these mature and commence bearing when they are three days old. Thus it will be seen, they almost double their numbers daily, and the progeny of a wingless female, if all live, will in twenty days amount to upwards of two millions.

No remedy is yet known for this grain aphis. Fortunately it is but a transitory evil. Nature has provided a number of other insects which are its inveterate foes, which slay and feed upon it. Hence,



Fig. 15.—GRAIN APHIS. THE WINGLESS FEMALE.

wherever any species of plant louse becomes numerous, these their destroyers soon become gathered, and rapidly multiply till they overbalance and exterminate it. Among the most common and oftenest noticed of these destroyers of the aphis, is the lady-bug or Coccinella, the largest species of which are the size and shape of a half pea, of a bright red or yellowish colour, and ornamented with small black spots. Immense numbers of these are seen at harvest time in all the grain fields where the aphis is numerous. Quite frequently upon the grain heads there will also be noticed here and there an aphis of an unusu-

ally large size, position, but to the colour of several species within the bodies of lice. Flying upon the stalks of an insect of a grass appearing like eyes like burn Golden-eyed fly. erous species, fo in the order Ne their white eggs hair-like threads one or more, on the aphis. The worm. Its four tubes, with the grasps and pierce sucks out the ju

The Grain Weevil (Linnaeus) is a sn though of a ches hatches from th at its natural siz



Fig. 16.—GRAIN WEEVIL.

sects infest store Indian corn and these grains are and stale, it is a serve them from the other of the the most efficacie evil and preservi We often hear he weevil. Ho the midge is, wi figure 16 with fig

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INSECTS WHICH INJURE GRAIN CROPS.

ally large size, and standing in a natural position, but motionless, dead, and faded to the colour of brown paper. These have been stung by parasites, of which there are several species whose young are reared within the bodies of these and other plant lice. Flying in the grain fields or alighted upon the stalks, will also be noticed an insect of a grass green colour, its four wings appearing like fine gauze or lace and its eyes like burnished gold. This is the Golden-eyed fly, of which there are numerous species, forming the genus *Chrysoba* in the order Neuroptera. These flies place their white eggs on the ends of slender, hair-like threads. They may often be seen, one or more, on grain heads infested with the aphid. They hatch a small active worm. Its formidable jaws are hollow tubes, with the sharp points of which it grasps and pierces the skin of an aphid and sucks out the juices of its body.

The Grain Weevil (*Calandra granaria*, Linnaeus) is a small oblong black beetle, though of a chestnut red tint when it first hatches from the pupa. It is represented at its natural size in the upper, and magnified in the lower figure of the annexed cut, 16. This insect infests the ripened grain only, the worm residing in the interior of the kernels and consuming the flour, but leaving the hull entire. Another species, the Rice Weevil (*Calandra Oryzae*, Linnaeus) is closely like it, but on its wing covers four red spots may be faintly discerned, these spots becoming more perceptible when the specimen is wet. Both these in-

sects infest stored wheat, barley, rye, oats, Indian corn and rice, and when either of these grains are long kept and become old and stale, it is almost impossible to preserve them from being destroyed by one or the other of these weevils. Kiln-drying is the most efficacious mode of arresting the evil and preserving the infested grain.

We often hear the wheat midge called the weevil. How wholly unlike a weevil the midge is, will be seen by comparing figure 16 with figures 1 and 2.

In the cultivation of Indian corn, the worst enemy we encounter is the Cut Worm, which by night severs the young plants at or a little above the surface of the earth, and lies concealed during the day slightly within the ground. These worms also cut off the cabbages, beans, and other young tender plants in our gardens.

They are so well known that any particular description of them and their habits is unnecessary. These cut worms are the



Fig. 17.—CUT WORM MOTH.

larvæ of several different species of dark coloured millers or moths, which pertain for the most part to the genus *Agrotis* in the family Noctuidæ and order Lepidoptera.

And as few persons have any definite idea of the kind of millers which breed these worms, we present in cut 30 a figure of one of the most common species, its natural size.

This is the Gothic dart moth, *Agrotis subgotiaca*, Haworth, and more recently *Agrotis jaculifera* Haworth, and more recently named *Agrotis jaculifera* by Guenée. It is one of the millers which in July and August most frequently flies in at open windows in the evenings attracted by the light of the lamp. And the other species are similar to this, though usually of darker and more sombre colours, with the fore wings less diversified with marks and spots.

INSECTS INJURIOUS TO GARDENS.

The Cucumber Bug or Striped yellow beetle, (*Galeruca vitata*, Fabricius) is nearly a quarter of an inch long, of a bright sulphur yellow colour, with a black head and three black stripes on its wing covers. It gnaws the young stalks of the cucum-



Fig. 18.—THE ONION FLY.

ber, squash and melon vines, causing them to wilt and die, sometimes wholly severing the stalks. When approached it spreads its wings and flies away. You will notice it flies off from the vines in a horizontal direction, being unable to rise upward. This habit leads us at once to a simple and perfectly efficacious mode of protecting the vines from it. Place over each hill a box open at the bottom and top. The beetle alighting upon the young plants, and see-

INSECTS INJURIOUS TO GARDENS.

ing no opening on either side where it can fly off horizontally if menaced by danger, will not venture to remain there. When the vines grow to rise above the boxes, they are no longer in danger, and the boxes may then be removed and laid aside for use the following year. Dusting the plants with powdered charcoal, or with soot, so often recommended in our agricultural periodicals, is perfectly worthless.

The Squash Bug pertains to Latrelle's genus *Gonocerus*, whereby its correct scientific name is *Gonocerus tristis*, Degeer. It is from a half to nearly three-fourths of an inch long, and is a flat backed, dark brown bug, of a loathsome smell, related to the chinch bug mentioned on a previous page. It occurs on squash, pumpkin, and other vines, in company with the preceding insect, and is equally pernicious to them, puncturing the stalks and leaves and sucking out their juices, thereby causing them to wilt and wither. It begins to lay its eggs on the leaves the latter part of June, and afterwards the whole family of its young is seen clustered together on the under side of a particular leaf. Wherever these are seen the leaf containing them should be cut off and trampled upon till all are destroyed. And when one of the parent bugs is seen on the vines, it should be picked off and treated in the same manner. They are easily found, in consequence of their large size.



The little black Flea Beetle (*Halica pubescens*, Illiger,) the wavy striped flea beetle (*Halica striolata*, Illiger,) and a few other similar species, eat numerous small holes in the leaves of cucumbers, cabbages, beans, and other garden plants. Sprinkling the plants occasionally with lime water renders the leaves distasteful to these insects.

The Onion Fly (*Anthomyia Ceparum*, Meigen,) is a small ash gray fly, about half the size of the house-fly. It is represented magnified in fig. 18, the cross lines underneath showing its natural size. This fly lays its eggs on the leaves of the onion close to the ground, most frequently when the plants are quite small. The maggots which hatch therefrom are blunt at one end, and taper to a point at the opposite end. They descend into the bulb, where they feed, and remain during their pupa state, as shown in figure 19. The bulb becomes rotten soon after they enter it, and the leaves above the ground die and turn yellow. In particular gardens all over our country the onions are all destroyed, year

Fig 19 — WORMS OF THE ONION FLY

after year, by this fly. Strewing powdered charcoal over the beds is said to be the most successful measure for repelling these flies from them.



Fig. 20 — ROSE BUG.

The Rose Bug (*Macrodactylus subspinosus*, Fabricius) is represented its natural size, in fig. 20. It is a buff yellow beetle with shining yellow legs and very long black feet. It appears the latter part of June, and remains out about a month, feeding mostly on the blossoms and leaves of the rose. But at times it becomes immensely multiplied in a particular locality, and then attacks the grape, apple, cherry, plum, and even some of the wild forest trees, stripping them of their fruit and leaves, and sometimes hanging in clusters from their limbs, like a swarm of bees. Hand picking, or, early in the mornings, beating and shaking them from the trees upon sheets and crushing, burning, or otherwise destroying them, is the only remedy for them at present known.

The Asparagus Beetle (*Crioceris Asparagi*, Linnæus) is a European insect most pernicious to the asparagus, which has never been known in this country until the year (1862) when it made its appearance in Queens county, N. Y., threatening to ruin this most valuable Long Island crop. The beetles and their larvæ feed upon the asparagus through the whole summer season. The annexed cut, 21, gives a view of this insect in its different stages. The beetle is



Fig. 21.—ASPARAGUS BEETLE, ITS EGGS AND LARVÆ.

seen its natural size and shape at *a*. It is of a deep green-blue colour, ornamented with yellow spots, and places its eggs on the leaves of the plant as represented at *b*, the magnified eggs being seen at *c*. From these hatch a larvæ of a dull olive or ash gray colour, which is represented young at *d*, full grown at *e*, and magnified at *f*. Its pupa state is passed under the ground. Picking off these insects and their young, by hand, and trampling upon them, is the only remedy for them which is known.

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CLIMBING PLANTS.

CLIMBING PLANTS.

THOSE who have visited the Ivy-clad cottages and palaces and ruins of the Old World, will never forget the admiration with which they first beheld this wonderful plant, which fastens its little rootlets into every crevice, bearing its heavy masses of glossy green foliage hundreds of feet aloft, to the very point of the castle tower, never once faltering or losing its hold upon life and the old ruin, even though its trunk be severed in twain and all sustenance from the earth cut off. Its

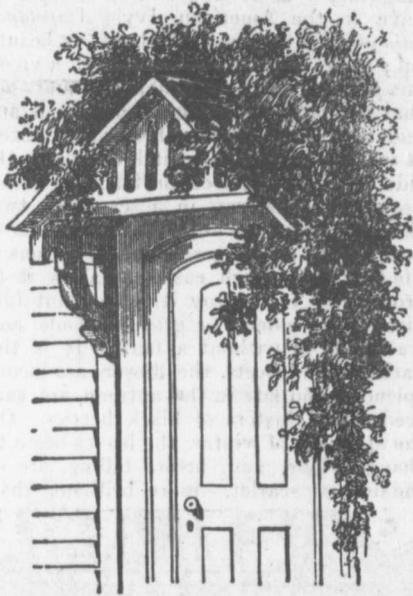


AMERICAN IVY.

little rootlets seem to draw all needed nourishment from its rocky support.

While we have gazed with absorbing interest on the Ivy-clad abbey, rich in his-

toric associations—a broken link, feebly binding the distant past with the present—our most pleasant recollections are of the ivied cottages, and especially of the little



WISTARIA VINE.

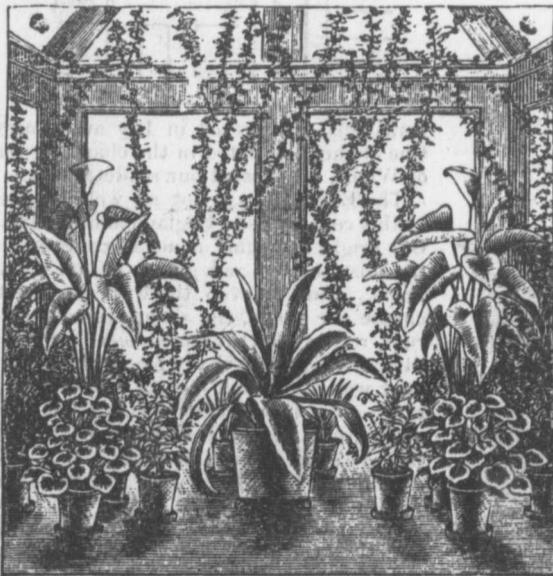
rural inns, embowered in Ivy and Roses. One of these, situated in the charming Isle of Wight, we present our readers.

The English Ivy is not so well adapted to this country as to England and Scotland. Our bright sunshine is not so congenial as the mist and fog and gloom of its native home. Indeed, even there it seems to choose the gloom, the dampness and the ruin, rather than the more cheerful aspects. Still, if Planted in shady places, it succeeds very well, and shade seems almost necessary: even in winter our bright suns cause more injury than the severest frost. For indoor decorations, however, we have nothing to equal the Ivy. It will endure more hardships, flourish under more unfavourable circumstances, and endure darkness, gas and dust better than any plant we think of at present. A pot of Ivy each side of a bay window will furnish beauty and freshness all through the winter months. In spring the plants may be set on the north side of a fence or building, and there will remain without care until autumn, when they are ready for re-potting and usefulness all through the next winter. Its branches and leaves are unsurpassed for floral decorations.

CLIMBING PLANTS.

For a *Balcony Plant* the Ivy is especially desirable. Strong plants, placed in every rich soil in boxes or large pots, and well-supplied with water, will make a rapid growth, and furnish a green trimming or back ground for flowers that can be obtained so easily and cheaply in no other way with which we are acquainted.

While it is true that we cannot grow the English Ivy as it is grown in Europe, we have in the American Ivy, *Ampelopsis quinquefolia*, a substitute almost as beautiful; perfectly hardy everywhere, a vigorous grower, easily transplanted, and one that will flourish anywhere on any soil, and under the most unfavourable circumstances. It will come up from a little root by the side of a stump or tree, or fence or stone-heap, and transform, in a season or two, the most unsightly object into a wonder of beauty. It is so vigorous and tenacious of life that it is much easier to allow it to grow than to destroy it. No plant furnishes a more dense or graceful shade, and we think it without a fault. It is the harbor of no insects, the flowers are inconspicuous, and late in the autumn are succeeded by clusters of black berries. On the approach of winter, the leaves begin to change colour, and, before falling, are of the deepest scarlet,—more brilliant than

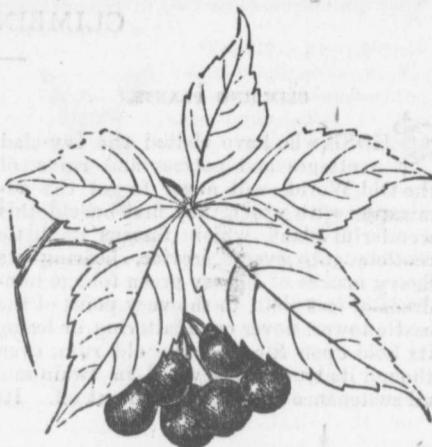


WINDOW GARDEN, WITH IVY.

any of the autumn leaves, except perhaps the Sumac and the Maple.

We present our readers a view of a church adorned with this beautiful hardy climber. This plant, being a native of our open woods and fields, can be procured by many with a little trouble and no ex-

pense, while good plants can be purchased at any of our nurseries for about twenty-



AMERICAN IVY.

five cents each, and may be planted either in the spring or autumn.

The Virginia Creeper supports itself well in almost any situation, by its numerous spiral tendrils, which are as strong almost as wire, and grasp an object within their reach with a firmness that defies the fiercest winds and storms. Indeed, were it not thus tenacious in its hold, its mass of heavy foliage would render it a prey to every storm. These tendrils not only wind around any object within their reach, but when the plant ascends any smooth object, like the trunk of a tree, act as rootlets, and fasten themselves in the bark so firmly that it is almost impossible to remove them without the destruction of the bark or any similar object to which they may be attached.

The Chinese Wistaria, *Wistaria Chinensis*, is certainly one of the most magnificent hard-wooded Climbing Plants in cultivation. Never shall we forget the time when first we saw the plant in flower—a mature plant, covering the whole side of a building, bearing hundreds of its long, pendulous racemes of light blue flowers. It was at first thought that the Wistaria was too tender for any but a Southern climate, and in the North must be confined to greenhouses, where it was soon found running along the rafters, in this way taking the place of the time-honoured Passion Vine. It was ascertained, however, to be hardy, though it is

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CLIMBING PLANTS.

well to cover young plants for a year or two after planting. The growth is sometimes rather small for a year or two, when it will start and grow twenty feet or more in one season. Flowers are not generally produced until the plant becomes pretty strong. The racemes are often twelve inches in length and densely filled with its delicate, light purple flowers which are highly perfumed. The foliage is abundant and of a lively green. The flowers appear about the last of May in this section, and before the leaves, or at least before the leaves become conspicuous. It very often gives a few flowers later in the season, in fact we have known plants produce flowers almost every month until autumn.

The Clematis is one of the most prized of the Climbing plants. The old *Virgin's*

but all other varieties are entirely eclipsed by the new English hybrids, like *Jack-*



CREMATIS ON ROCKERY.

manii, with flowers five or six inches across, borne in immense quantities almost



ENGLISH IVY-COVERED INN.

Bower, C. Virginiana, we remember as long as we do anything, with its little common white flowers, and the seeds terminating in long, feathery curly tails. Among so many good things it is still a desirable Climber. *C. flammula* or *European Sweet*, is an excellent fragrant plant :

through the entire summer. Our only fears have been that these fine sorts would not prove hardy at the North ; and they may not entirely so, though we have wintered a good many, and very few have shown any ill effects from the severest winter.

EXHAUSTION OF SOILS.

BY J. B. LAWES.

THE late Baron Liebig, who employed the abilities of the very highest order in the inquiry, gave it as his opinion that the exhaustion of the soils of England was due to a deficiency of phosphate of lime, and further, that if a cheap and abundant source of this substance could be discovered, we might grow all the wheat required by our population. For the last quarter of a century our farmers have had at their disposal abundant supplies of phosphate of lime; for a few cents they can purchase all that is contained in a bushel of wheat. Each year, however, finds us importing more and more corn, and at the present time fully one-half the population of these islands is supported entirely upon bread made from foreign wheat. It was also the opinion of Baron Liebig, and this opinion is very prevalent at the present day, that the constituents of the soil which are removed by crops should be returned to it in some form of manure or chemical salt. Such a procedure would doubtless be an effectual remedy for the exhaustion of soils, but it ignores the fact for which I am disposed to contend, that soils are meant to be exhausted. All soils which have never been cultivated by man possess a natural or standard fertility belonging to their geological formation, and a more readily available fertility arising from the accumulation of living and decayed vegetable matter on their surface. The latter state of fertility has long ceased to exist in England, while the former is as distinct as ever after centuries of cultivation, and is appropriately designated by farmers under such terms as "very fertile," "rich," "poor," "hungry," &c.

Now the most vehement advocate for the non-exhaustion of the soil would hardly be disposed to contend that the surplus fertility of a newly cleared settlement in the States does not form part of the natural wealth of the country; or, assuming that it takes the form of 100 bush of maize on the acre, and is followed by two or three more of large but probably diminishing crops, that such an exhaustion of the soil is not perfectly legitimate; also that in such operations, to attempt to restore to the soil the constituents removed by the crops would be absurd. Now it appears to me that from the starting point where I have assumed that the removal of plant-food from the soil without its restoration,

or, as it is commonly called, the exhaustion of the soil, is perfectly legitimate, there is none of the successive stages of such exhaustion at which it is possible to say that it ought to be arrested. Judging from my own soil, which has been subjected to the most rigid process of exhaustion that could be brought to bear upon it, I should say that soils have a wonderful power of resisting exhaustion. A few years of corn-growing without manure would, I used to think in the early days of my experiments, be sufficient to bring its corn-producing powers to a standstill, but at the end of nearly forty years we are discussing whether the decline in produce which the last of two equal periods of years shows over the first period, is due to greater exhaustion, or to a larger proportion of unfavourable seasons in the latter half the period than in the former.

The State of New York may be brought into comparison with a country like England, as the fluctuations in its agriculture in a limited period are not of that startling nature which characterises the agriculture of the United States in general. I shall therefore take the agriculture of the State of New York in the following comparisons with that of England. In our statistics of agriculture, a line is drawn through the centre of England, dividing it into two districts; one, containing 21 counties, is called the western and grazing district; the other, the eastern or corn district, also containing 21 counties. As the grazing district more nearly resembles New York State in its agricultural character, I propose to adopt that district in my remarks.

According to the census of 1870, the improved land in the State of New York was a little over 15½ million acres. In the ten years of 1866-75 the amount of land under hay, potatoes, and corn, varied from six to a little over eight million acres. These fluctuations, although large, do not appear to be due to any change in the area of improved land, but rather to the influence of prices, reducing or increasing the area of cultivation. In 1866 the area under these crops was eight and a third million acres; from this point it declined gradually until the year 1871, when it reached the lowest point of 6.16 million acres; advancing again until it reached nearly eight million acres in 1875. The number of acres of land contained in the twenty-one grazing counties of England is 12,908,000, or nearly thirteen

millions. This and pasture, b and heaths.

During ten years taken place in crops grown. ing any compar of the State of 21 grazing coun as well to notice of difference be two countries, a ing. The New of the land, he vate what crops system of cultiv ducive to his im average 103 acre improved land. farm work is d family; the am ceeding, on an yearly.

In common, h farmer, he has b low prices, an joice in the try, he may nearly 30 million cultivation in t what depressing his own crops. vated in New Yc in England, viz., the United State ably grown in E cient warmth in and buckwheat. here, but have gi products. All o both countries, which constitute lish agriculture, general reports.

The English fa soil. For a fixed it by lease, agree any agreement, b what he may or has but little libe he may not grow succession, and h or roots. These established at a known respecting when fertility cou much less necessa cently made an s tered and modi so great betw the land acting on one side of the bound by numeri side, I was somew

EXHAUSTION OF SOILS.

millions. This includes all crops, fallows and pasture, but excludes mountain land and heaths.

During ten years but little change has taken place in the amount of the various crops grown. Before, however, instituting any comparison between the farming of the State of New York and that of the 21 grazing counties of England, it will be as well to notice some of the marked points of difference between the farmers of the two countries, and their methods of farming. The New York farmer is the owner of the land, he can do what he likes, cultivate what crops he pleases, adopt whatever system of cultivation he thinks most conducive to his interests. He owns, on an average 103 acres, of which about 73 are improved land. The greater part of the farm work is done by himself and his family; the amount of wages paid not exceeding, on an average, \$2.20 per acre yearly.

In common, however, with the English farmer, he has been recently suffering from low prices, and much as he may rejoice in the progress of his country, he may possibly think that nearly 30 million acres of land brought into cultivation in ten years may have a somewhat depressing effect upon the value of his own crops. Three of the crops cultivated in New York State are not cultivated in England, viz., maize, the great crop of the United States, which cannot be profitably grown in England for want of sufficient warmth in the autumn months; rye, and buckwheat. These used to be grown here, but have given place to more valuable products. All other crops are grown in both countries. Mangels and turnips, which constitute a distinct feature in English agriculture, are not noticed in the general reports.

The English farmer does not own the soil. For a fixed annual payment he holds it by lease, agreement or, in the absence of any agreement, by custom, which settles what he may or may not do; so that he has but little liberty of action. Generally he may not grow two white-straw crops in succession, and he may not sell hay, straw or roots. These restrictions, which were established at a time when nothing was known respecting the food of plants, and when fertility could not be purchased, are much less necessary now; and I have recently made an attempt to get them altered and modified. With distinctions so great between the owner of the land acting with perfect freedom on one side of the Atlantic, and the tenant bound by numerous restrictions on the other side, I was somewhat surprised to find so

general an agreement on many points as the following table exhibits:—

TABLE I.—Showing the number of acres of land under the various crops in the State of New York, on an average of ten years—1866-75—compared with the crops in twenty-one counties of England called Grazing Counties; also, the number in each crop in 100 acres.

	New York.	England	New York.	England
	Acres.	A. res.	Per cent.	Per cent.
Corn crops..	2,971,000	2,761,443	19.	21.4
Potatoes....	269,000	179,000	1.72	1.4
Other green crops.....	.....	973,317	0.	7.3
Fallow.....	156,000	251,459	1.	1.9
Hay.....	3,910,000	2,843,841	25.	22.
Not for hay.	8,305,000	5,882,612	53.2	45.6
Total.....	15,610,000	12,896,672	93.92	90.9

The State of New York contains 2,500,000 acres more than the twenty-one English grazing counties; in order, therefore, to bring them to an equal standard for comparison, we must look at that part of the table which shows the amount of the various crops in every 100 acres. It will be seen that the English farmer grows rather less than 2½ per cent. more corn* than the New York farmer, and that they have almost the same amount of land in potatoes and fallow. Of other green crops, such as mangels, turnips, and vetches, he grows 7½ acres in the 100, while the New York farmer grows an area too small to be appreciable. The latter has, however, a larger acreage of land not for hay, and if we add to the 45½ English acres not for hay, the 7½ acres of green crops which are always consumed on the farm, we have a close agreement between the two countries with regard to the number of acres employed in feeding stock. This will be seen in the following table:—

New York.	England.
Acres per cwt.	Acres per cwt.
Not for hay..... 53	Not for hay..... 45½
—	Green crops.... 7½
53	53

With regard to the amount of land which is in permanent pasture, that is to say, land which is never ploughed up, there is in the 12.9 million acres of the English grazing counties 7,000,000 acres, or 56 per cent. of the whole; but I have searched in vain through the New York transactions for some information relating to permanent

* The general reader may not be aware that the word corn in England includes all kinds of cereals.

EXHAUSTION OF SOILS.

pasture in that district. In the returns for 1865 it is stated that 6,000,000 acres were in pasture in the previous year, and about the same quantity in meadow; but this does not give the information I require. The only reference to permanent pasture occurs in connection with some trials of mowing machines. It is there stated that the meadows had not been broken up during Mr. Monson's recollection, but how far back his recollection extended is not mentioned. The botanical analysis of the herbage of the meadow is given, and the number of species growing is stated to be unusually large. I find there are, in all, 52 species of plants, of which 10 are grasses, 2 clovers, and 40 are weeds. On the Rothamsted pasture, which has been unmanured for 22 years, and from which a hay crop has been carried off every year, there were at the commencement 50 species of plants, of which 16 were grasses, 4 were clovers, and 30 were weeds; and there has been little variation in the amount of species during the whole of the period. On an adjoining piece of land, which started with the 50 species, but which has received a very large quantity of chemical salts every year, the change in the herbage has been very great; the weeds and clover have almost disappeared, and of the original 50 specimens only 16 remained at the end of 16 years. Of these 16, nine were in quantities of only a few pounds per acre, while two grasses, the *Dactylis*, or cock's-foot, and *Alopecurus*, or meadow fox-tail, which in the original pasture occupied quite an insignificant position, now constituted the greater bulk of the crop. A professed botanist, who makes a complete separation of all the plants in each experiment every five years, made the weight of these two grasses alone to be $1\frac{1}{2}$ ton of hay per acre. The cock's-foot and fox-tail are considered to be amongst the most nutritious of our grasses; thus we have a striking illustration in this experiment of the power of the better sort of plants, under the influence of an abundant supply of food, to drive out those of an inferior nature.

I am disposed to think that permanent pasture does not prevail extensively in the State of New York, but that after one or more years the land is broken up. In the English grazing counties, 56 acres out of the 100 being always grass, we have 44 under arable cultivation, of which one-half is in corn. The greater part of the grain is sold, and also the potatoes. The remainder of the produce is used directly or indirectly to produce meat or other animal products. The New York statistics afford no information respecting the quantity of hay sold off or consumed on the land, nor, indeed, do

those of my own country; but while I can fill up from the blank from personal knowledge in one case, I have nothing to guide me in the other. In the following table is given the amount of live stock kept in the two countries over the adopted area, and also the calculated quantity kept per 100 acres in each country.

TABLE II.—Showing the amount of stock kept in the State of New York in 1875, on an area of 15.61 million acres; and in the twenty-one grazing counties of England, on an area of 12.89 million acres; also the number calculated in 100 acres.

	New York.	England.	New York. 100 acres.	England. 100 acres.
Horses.....	697,100	536,739	4.4	4.1
Cattle.....	2,159,500	2,621,232	13.8	20.
Sheep.....	1,935,500	9,697,359	12.5	75.
Pigs.....	563,700	1,023,734	3.6	8.

With the exception of horses, of which the quantity kept for 100 acres is rather larger in New York State than in England, the amount of stock kept in England is very much larger; in sheep more especially the difference is very great and requires some correction. The statistics of Great Britain comprise all the cultivated and pasture land, and exclude mountain, heath and other waste land, but they include the whole of the stock wherever kept. The returns of stock in a country in which there is any large area of mountain or waste land, show therefore, more stock principally sheep, than actually derive their support from the land included in the cultivated acreage. The only means we have of correcting this error is to take as a basis the amount of stock kept in counties where little or no waste land exists, and to deduct any excess which we find in counties where there is much waste land. In a majority of the 21 counties which are included in the grazing districts there are practically no waste lands upon which stock are kept, and several of these keep 20 oxen and 100 sheep per 100 acres, which is more than the average; but these constitute the finest land in the country. Some of the northern counties which have much waste land, carry 133 to 138 sheep on the 100 acres; part of them are certainly fed on waste land, and possibly a reduction of from ten to fifteen sheep per 100 acres over the whole area would meet the case. I have no data to guide me in forming any opinion respecting the amount of stock kept upon the unimproved land in the State of New York. In the following table will be seen the number of acres per cent. of each crop grown in the State of New York, and in

the twenty or also the aver

TABLE III.—Showing the crop in 100 the 21 grazing counties produce per

	No. of acres.
Maize.....	3.9
Wheat.....	3.9
Rye.....	1.4
Oats.....	6.7
Barley.....	1.7
Buckwheat	1.4
Total....	19.0
Average..	..

The New York figt age of 10-year of the English best data I ha

I made some investigations of bread consumption in order to arrive at the average wheat crop; from that our average is 28 bush.; but in this country is less than the wheat than the considered the produce bushels less. Since made for the above table grows 19 acres of improved land, average 479 bush. also of crops being given of England gives every 100, average bush. altogether grain being grown.

[Mr. Lawes proceeds the amount of the plant food which are State of New York, quantities of produce off the land.]

It will be that the average removed in grain phosphoric acid 64 In potatoes the substances is the lbs. instead of 5 lbs. Hay removes a

EXHAUSTION OF SOILS.

the twenty one English grazing counties ; also the average produce of each crop :—

TABLE III.—Showing the number of acres in each crop in 100 in the State of New York and in the 21 grazing counties in England ; also the produce per acre of each crop :—

	New York. No. of acres.	England. No. of acres.	New York Produce per acre, bush.	England. Produce per acre, bush.	New York. Total in bush.	England. Total in bush.
Maize	3.9	..	31.6	..	123.24	..
Wheat	3.9	9.8	14.0	26	54.6	254.8
Rye	1.4	..	14.2	..	19.88	..
Oats	6.7	5.0	32.2	40	215.74	200.0
Barley	1.7	6.6	22.0	30	37.4	193.0
Buckwheat	1.4	..	20.0	..	28.0	..
Total....	19.0	21.4	..	..	478.86	652.8
Average. ..	..	..	..	..	25.1	31.0

The New York figures are calculated from an average of 10 years, 1866-75 ; the average produce of the English counties is estimated from the best data I have at my command.

I made some years ago a very careful investigation of the amount of bread consumed by our population in order to arrive at the produce of our wheat crop ; from this it would appear that our average produce per acre amounts to 28 bush. ; but as the western half of the country is less adapted for the growth of wheat than the eastern half, I have considered the produce to be 26 bush., or 2 bushels less. Similar estimates have been made for the other crops. According to the above table the State of New York grows 19 acres of corn in every 100 of improved land, averaging 25 bush. per acre, or 479 bush. altogether ; six different sorts of crops being grown. The grazing counties of England grow 21½ acres of grain in every 100, averaging 31 bush. per acre, 653 bush. altogether ; three different sorts of grain being grown.

[Mr. Lawes proceeded to construct a table to show the amount of the more valuable ingredients of plant food which are removed from the soil in the State of New York, calculating it from assumed quantities of produce, and assumed quantities sold off the land.]

It will be seen by this table that the average amount of nitrogen removed in grain is 21½ lbs. per acre, of phosphoric acid 6½ lbs., and of potash, 5 lbs. In potatoes the amount of the two former substances is the same ; but of potash 8 lbs. instead of 5 lbs. are removed by them. Hay removes a much larger amount of

nitrogen than corn, and more than three times as much potash. Owing to my ignorance with regard to the number of acres required to keep live stock, I am unable to assign to each acre the constituents removed, I therefore give them altogether. There are 53 acres of pasture in every 100 in the State of New York ; and if this area kept the stock, we should arrive at the amount of constituents removed per acre, by dividing the figures I give by 53 ; or, if the hay is consumed by the stock, by dividing these figures by 80.

TABLE IV.—Showing the amount of nitrogen, phosphoric acid and potash, in pounds, per acre, removed every year from the land, first, assuming that the grain, potatoes, meat and milk, are sold off the farm, the straw and hay being consumed and returned to the land in manure ; and secondly that the hay also is sold off the farm.

	Nitrogen in pounds.	Phosphoric acid in pounds.	Potash in pounds.
Removed per annum, in 19 acres of grain.	21½	6½	5
Ditto in 19 acres of grain, 1.74 acres of potatoes	21½	7	8
Removed per acre of hay sold.	35	9	17
Removed in live weight of animals and milk	122	62	14½
Average per acre over 100 acres, if corn, potatoes live weight, and milk sold	6	2½	1
As above, with hay sold	14½	4½	10½

In either case it will be seen how exceedingly small is the amount of plant-food removed by animals and in their products. The last line but one gives the amount of nitrogen, phosphoric acid, and potash removed per acre per annum over the 100, assuming that all the corn, potatoes, live stock and milk are sold off the farm, and the straw and hay consumed or returned. The last line gives the same, with the hay sold instead of being consumed. The difference in the removal of these substances when the hay is sold is very striking, showing plainly how much this crop exhausts the soil. It will, I fear, be some considerable time before figures like these become of any real value to practical farmers ; the removal of a few more or less pounds of one substance or another over an acre of land being only bare facts which do not tell him what he wants to know ; such as, whether his soil is becoming exhausted of these substances too rapidly, or whether one ingredient is being removed faster than others, relatively to the amount which his soil contains. Neither does it tell him whether it would pay to restore these constituents in some artificial

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SURFEIT.

NONE of the most common affections among horses is that usually known as Surfeit. The term is too frequently employed to denote any or all the disorders of the skin, and from this cause much confusion arises.

There are two conditions which strictly belong to this category, one characterized by few external signs, the other attended with numerous swellings. The causes of each are very similar, having their origin in a disordered state of the digestive system, added to which certain adventitious influences are exerted, and so produce modified conditions.

In the first form of surfeit, commonly known as prurigo or pruritus, there is an intolerable degree of itching, which causes the animal to rub himself violently against everything he can get near, and in these acts the hair of the mane and tail is extensively removed. The skin becomes very hot, and there is sometimes a degree of attendant fever. In some cases the irritation is mainly confined to the legs. In old established cases the skin is thickened, the scales (outer layer) are considerably increased, and large patches of this nature are spread over the surface of the body, the hair being entirely absent.

The second form of surfeit is known as Nettle-rash or Urticaria, and makes its appearance in the nature of sudden eruptions in different parts or over the body. The swellings vary in size, from a hazel-nut or walnut to that of a man's hand. In one instance which occurred some years ago under our observation, the disease assumed the shape of a broad belt, and extended from the side of the neck, over the shoulders, ribs, and flank, to the haunch. Occasionally the swellings are but few, small and isolated, while the more severe cases are attended with febrile symptoms, and even attacks of disease in the respiratory organs. The swellings also now and then under irritation enlarge and are converted into abscesses, particularly about the back and neck, beneath the collar or saddle, and other closely fitting harness.

Animals having a full habit of body are mostly affected, particularly when the food is too rich and abundant, or after such is supplied too rapidly after animals have been badly fed and housed during the winter. Sudden chills and draughts of cold water while in a perspiration are com-

mon causes; prevailing cold winds from the north or east during the early spring, with the powerful sun in the day-time, have a great influence upon the system, because at this time it is laid under heavy contributions for supporting the growth of the new coat. The swellings may last from ten or fifteen days to many weeks, sometimes occasioning no perceptible uneasiness or disturbance, while the simple pruritus, or itching, will remain upon the animal for a year or more.

The treatment in each case in its simplest form consists of a low diet of bran mash with linseed tea, &c., for a few days. The bowels should be freely moved by a purgative; and a lotion, composed of one or two ounces of tincture of arnica, or merely spirits of wine, to a pint of water, may be sponged over the affected parts two or three times during the day. The severe itching is sometimes very readily allayed by using weak acidulated solutions, as two ounces of the oil of vitriol to one gallon of water.

If the respiratory organs become affected, the treatment assumes a more difficult nature, and the advice of a skilled veterinary surgeon is desirable.

STINGE IN OXEN.

The second form of surfeit, as noticed already under the technical term of Urticaria, is sometimes seen in cattle during the hot days of the spring and summer months. There is one special peculiarity in its mode of attacking these animals, arising, no doubt, from the different habits and other conditions. It is seldom to any extent over the body, but mostly appears very suddenly in the shape of swellings about the muzzle and nostrils, extending some distance along the skin and lining membrane of the nose; and there, impeding the passage of air in respiration, produces distressing symptoms of suffocation. The common remedy of the cowman and dealers is the use of the knife, with which he divides the septum, or partition of the nostrils, and thus effects a local blood-letting, which relieves the parts.

The cause is plethora suddenly produced by rich food and inactivity, especially after scarcity. Animals previously confined during cold weather on bad pastures, and incautiously turned upon others that are forced by warm weather and gentle showers, are the usual victims. Purgation, water containing nitre for a few

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days, and a less stimulating diet are the usual means necessary for effecting a cure, and also warding off attacks in animals that are observed to be "doing" too well.

CHAFES AND GALLS OR FRETS.

Another source of annoyance among working horses, is the frequency with which the skin is chafed and rendered sore in some animals. As soon as the days become warm and close, they perspire freely, and dust readily adheres to the damp surface; the harness rubbing or flapping over the skin afterwards very soon removes the hair, and creates a red and tender spot, or still worse it is raw, and, besides being red and very sore, discharges a thin clear fluid. Horses that are badly groomed are common sufferers, and those having collars too large, saddles and other parts fitting badly, or probably working with one trace too long, often return to the stable with very bad wounds.

Under all circumstances great attention should be paid to working animals at this season. The skin should be thoroughly cleaned, and the harness likewise freed from all accumulations of hardened sweat and dirt; and those parts which admit of the process are best treated with an occasional dressing of oil. As horses increase or decrease in size, great attention should be directed to the collar, as any alteration in the condition may render this part of harness a very dangerous member during even a moderate journey or day's work.

The treatment of chafes is very simple, arnica lotion, composed of one part of tincture of arnica to twelve of water, is a good remedy. It may be applied by a sponge or soft rag. A little nitre may be given in the bran mash, and the parts when very raw should be dressed with glycerine, and then dusted with flour.

ABORTION OR PREMATURE LABOUR IN MARES.

It is common to hear sad accounts of farmers here and there losing foals in premature birth, and sometimes the loss is extended to the mares as well. From the frequency with which such have taken place in successive years, and have come beneath personal observation, after carefully estimating all conditions, we have concluded that 99 per cent. of such losses ought not to occur. We may therefore usefully consider the subject in a separate article.

Above we give brief consideration to a variety of skin diseases which come within the category of ailments of the season, the result of sudden alternations of temperature, acting powerfully upon the internal organs engaged in the digestive process and manufacture and elaboration of material for

building up and repairing the body. We now proceed to explain how the process of such disorder will in the end produce the so-called abortion or slipping the foal, and premature labour.

The effects of the application of cold to the skin at the time preternaturally heated, perhaps moistened, with perspiration, when the results are more speedy and permanent, are the contraction of superficial blood vessels, and determination or driving inwards to all large organs a large quantity of blood. At the time of pregnancy the womb of the mother requires a great amount of blood for the nourishment of the foetus, and under the influences of cold, wet, and exposure, it is not unlikely that the amount sent there may act injuriously. The foetus may suffer from general congestion, and even inflammation, and thus a partial or complete arrest of circulation may take place in its body. At other times the placenta or after-birth, through which all the blood passes from the mother to the offspring, may become, through the causes already mentioned, partially or completely involved in congestion or inflammation, beginning in small spots or centres, afterwards spreading outward, and by the union or confluence of many of these spots, interrupting the flow of blood entirely. From both these conditions the foetus is deprived of support, and consequently dies in the womb and must be expelled. Another cause of death of the offspring is the condition of the mother as depending upon the food, shelter, and general treatment during the previous part of the winter. Many farmers are too careless about the comfort and well-being of their pregnant animals, and vainly imagine that, as there may be little or nothing for them to do, they may endure, without damage, a fair winter's short commons, and make up for all deficiency when grass comes again. This is a very delusive and destructive argument, for the pregnant animals, above all others, requires more support at the time, for she has not only her own body to nourish, but all her functions are exerted to make blood for the rapidly-growing foetus and membranes inside the womb. She should, therefore, have proper food, and every domestic comfort, so as to keep up the natural functions to a suitable degree of activity; but if she is allowed to become poor, to subsist on common, coarse, and bad food, the blood becomes poor and fails to nourish the offspring, and it is born small, weak, and prone to disease. If it survive the first few weeks of life, it may grow up a sickly thing, liable to rheumatism and deformities, lameness, &c., and prove of more trouble than value.

The general result, however, is that dur-

ing the early spring weather prove most abundant, or if particularly of the autumn that the weak animal begins to make womb, the membranes spring also suffer flushing, that action quickly follows at once arrested from a species of Premature labour afterwards, for the foreign body, and is still another common foals. This is true various kinds. tend to produce conditions which result—cutting off between mother and death of the late turned into past the spring they are roll about. Rolling most fertile source The men should allowing mares in after coming in especially if they are from surfeit in its when the harness irritation is some application of cold moist with perspiration saddle, collar, &c., animal find herself out of the stable and the straw-yard, or at plough or draw even moderate trotting concussions receive doorways when they pass at the same time of premature labour the foal first. The mother and offspring ruptured—and the sequence.

But premature labour question confined to mare as frequently she not die, the effects may render her weak in a whole summer. mind that as the natural delivery a good conditions are being are only complete a foal is born. Amongst the ligamentation of the ligament so as to widen the other is the proper There are, besides the features, but we need

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ing the early spring, more especially if the weather prove mild and showery, and grass abundant, or if larger supplies of food, particularly of the artificial kinds, are given, that the weak and poverty-stricken animal begins to make blood too rapidly. The womb, the membranes, and even the offspring also suffer so much from the sudden flushing, that acute congestion or inflammation quickly follows, and the circulation is at once arrested. The offspring suffers from a species of strangulation and dies. Premature labour of course takes place afterwards, for the dead foetus becomes a foreign body, and must be expelled. There is still another common cause of death in foals. This is the effect of violence of various kinds. All, of whatever kind, tend to produce the same round of conditions which terminate in the same result—cutting off the supply of nutrition between mother and offspring, which causes death of the latter. When mares are turned into pastures for the first time in the spring they are apt to play, gallop, and roll about. Rolling on the ground is a most fertile source of premature labour. The men should be cautioned against allowing mares in foal to go loose too soon after coming in from work, and more especially if they are warm or are suffering from surfeit in its various forms. Even when the harness is removed an amount of irritation is sometimes set up by the application of cold to the parts that are moist with perspiration, as beneath the saddle, collar, &c., that no sooner does the animal find herself free than she rushes out of the stable and commences to roll in the straw-yard, or pasture. Heavy work at plough or drawing loads, severe and even moderate trotting in saddle or harness; concussions received in passing through doorways when two or more are trying to pass at the same time, are fruitful causes of premature labour by producing death of the foal first. The connexion between mother and offspring is broken off—ruptured—and the latter dies as a consequence.

But premature labour is not as a serious question confined to the foal only. The mare as frequently suffers, and, if she does not die, the effects of an untimely birth may render her weak and unprofitable during a whole summer. It must be borne in mind that as the time approaches for natural delivery a great many necessary conditions are being established, and these are only complete at the time when the foal is born. Among these are the relaxation of the ligaments uniting the hip bones so as to widen the birth passage; the other is the proper position of the foal. There are, besides these, other important features, but we need not stop to notice

them now. It will, however, be understood by this enumeration that if the foal is dead from any cause already named, and the period of delivery is yet far distant the proper relaxation of ligaments and position of the foal will not be secured. Parturition is therefore difficult and attended with danger. The passage is too small, and mal-position frequently makes matters worse, so bad, indeed, that the most skilful obstetric practitioner may fail to save the mare by effecting early and safe delivery.

It is sufficient for the watchful agriculturist to be informed of the causes which singly or combined may cause loss among his stock, and we feel assured if they were made a more general branch of study, mortality might be very much reduced among all kinds of stock. But while we have pointed out the evils of improper food in pregnant animals, we must not omit to state that excessive evils are sometimes—nay frequently—born of kindness, and some creatures are even killed by it. Large quantities of highly nutritious food, especially when accompanied with close confinement, may engender constipation, and succeeding that indigestion of an acute character—colic. If the animal rolls about in these attacks the foetus is likely to be torn from its attachments in the womb and premature labour take place; but the attack may kill the mare also by causing rupture of the stomach and some portions of the intestines.

COLIC.

The cause of colic has been attributed in special seasons to the scarcity of the usual kind of food, and substitution of coarser and inferior articles; and if the spring is late, causing the work to be much behind, and necessitating extra and severe exertion, the ordinary death-rate from this disease is surprisingly augmented, especially with pregnant mares. Thus animals over-taxed by work and below the mark in point of ability or condition, are more predisposed to disease, and, consequently, suffer most under the prevailing cause.

In this country, colic generally arises from the practice of giving too large quantities of food at once, particularly dry chaff and grain, after long fasts, and then allowing the animal to swell himself with water. By this practice the stomach is enlarged and weakened, digestion, is also more or less impaired, and the result is as we have said—disease, sometimes chronic, and at others fatal, from rupture of some important organ, as the stomach or large intestine, &c. Another cause arises from the practice of turning hungry animals upon plentiful pastures, or allowing too much green food the first time in the season.

One result of colic which sometimes

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leads to a great mistake, is that in which, after death, the greater part of the intestines are discoloured and black as a coal. It may happen that one portion of the canal slips inside itself as it were, a condition known as invagination or intussusception, occasioned by violent straining; in some cases also when the animal rolls violently, the expansion of membrane known as the caul and technically the *peritoneum*, which unites the intestines to the spine, is torn, and some portion falls through the opening. In each of these cases strangulation of the gut follows, and death soon afterwards, but the intestines are blackened only in the immediate neighbourhood of the accident. The condition we more particularly allude to is that in which fermentation within the stomach and intestines has been going on for some hours, and by constant pressure on the portal vessels, the flow of blood towards the liver is arrested. This prevents the veins of the intestines discharging their contents, and in turn we have extensive stagnation. The pains of colic from being unusually severe gradually lose their intensity, and the animal ceasing to roll about, persists in standing, resting first one hind leg and then the other. The pulse becomes small, rapid and imperceptible, breathing short, quick, and catching; cold sweats bedew the body, and after a few hours he drops down and dies in a few minutes. The arrest to the circulation of blood from the intestines towards the liver gives rise to an extensive and general strangulation. Sensation is destroyed, and the parts begin to die; but being so essentially important in the maintenance of life, the animal dies before mortification ensues. These cases, we have said, are liable to be mistaken for each other—local strangulation or invagination confounded with that arising from pressure on the portal vessels. Nice discrimination is necessary, therefore, and a careful post-mortem examination will not only determine the true state of affairs, but also suggest the cause—an essential matter in the course of prevention.

In the *treatment* of colic, there are as many opinions almost as stars in the firmament; and in course of practice, the advocates of each will produce corresponding results of a successful character; but this says little where all cases, arising from different causes, are treated by the same stereotyped remedies. Some advocate trotting the animal about, and even flogging, to keep him upon his legs.

As the animal finds most comfort from rolling about, the stall (a box or empty barn is much better) should be well littered down with straw, and there he may be allowed to indulge. Medicine should

always be at hand where horses are subject to colic, and the proper dose given at once. Oils of all kinds are too slow in action, and, besides, they nauseate the horse long after the attack is over. Nothing answers so well as aloes, given as a bolus or in solution, as preferred, the objection being on account of subsequent purgation, which may be induced. To obviate this, the following form may be used with great benefit; Solution of aloes, 4 ounces; sweet spirits of nitre, 2 or 3 ounces; essence of ginger (concentrated), 2 drachms—mix, and give at once; and if no relief follows in one hour, repeat the dose. Injections of soapy water are most valuable, and should be passed up the rectum at least every hour, until relief is obtained. The use of pepper, onions, ginger, &c., to the rectum, sheath, or vagina, for the purpose of inducing the animals to urinate or stale, is to be condemned as cruelty, as no relief is gained by the passing of urine; the affection is not connected with the kidneys, and the frequent attempts made by the animal do not indicate that, but rather disorder in which all parts almost participate.

In all cases *tepid* water may be allowed the animal to drink if he will take it, as the action of medicine will be greatly facilitated when much food is present, and there will be less liability to its becoming hardened and forming large dry cakes or lumps. The next thing of importance is to make the animal as comfortable as possible, and to do this he should be frequently rubbed down and the bed kept as straight as possible.

When much fermentation is present some practitioners use spirits of ammonia, in $\frac{1}{2}$ oz. doses largely diluted; and in order to allay excessive pain, powerful remedies are injected beneath the skin; but as a rule the simple means we have pointed out are generally successful.

The *prevention* of colic lies in the use of proper food—sound, dry provender—in moderate quantities supplied at regular intervals. Care should be taken to avoid long fasts, and the supply of large quantities of food, and especially cold water afterwards. The stomach being then weakened is not capable of true digestion, and the animal, very hungry, bolts the food without proper mastication and insalivation. All kinds of food which require cooking to make them savoury should be rejected. If they are not *naturally* tempting to the animal, no artificial preparation can make them useful or economical, as they produce disease, and the loss in the end is greater than the saving at the beginning. Bran or linseed tea may be given with chaff and corn, also a

moderate supply sufficiently loose when horses are green food is supplied, they show their fill. Large times are dangerous they happen to be kind.

BLAC.

Young cattle are disease which probably far than from any tagious affection. is variously known titles of Quarter-Speed, Hasty, Black. dependent upon their as influenced by various connected with age, and &c. Young cattle least it very rarely having had a calf when instances of have appeared in the disease assumes go far towards essential to that a some doubt exists statements which older animals. Your disposition to thrive are the common excess of blood is not acts as in older ones to the formation of animals pregnancy, together with great system, are causes valve, and thus prevent of over-repletion.

Black-quarter occurs this season than other. If the preceding winter with scanty pasturage limited to smaller quantities some cases, injudicious may, likewise, be not dry fodder forms the which are not in any furnishing large quantities ment to the system. has much to do with quarter cannot take winter; the digestive activity, supplying the which the body requires soon as the grass grows rains and bright obtains far more nutr can appropriate; they the blood vessels through seriously overloaded, very rich, that in various

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moderate supply of roots to promote a sufficiently loose state of the bowels, and when horses are turned upon grass, or green food is supplied the first time in the spring, they should not be allowed to eat their fill. Large quantities of food at all times are dangerous, but more so when they happen to be of a fresh and succulent kind.

BLACK-QUARTER.

Young cattle are liable to a form of blood disease which proves rapidly fatal, and from which probably the losses are greater by far than from any other known non-contagious affection. Black-quarter—or as it is variously known by the equally vulgar titles of Quarter-evil, Quarter-ill, Puck, Speed, Hasty, Black-leg, &c.—is purely dependent upon the condition of the blood as influenced by various circumstances connected with age, management, pasturage, &c. Young cattle are alone liable to it, at least it very rarely happens that cows after having had a calf become affected; and when instances of so-called black-quarter have appeared in the latter kind of stock, the disease assumes such characters as to go far towards establishing peculiarities incidental to that age only. There is then some doubt existing as to the truth of statements which relate such events in older animals. Young cattle in which the disposition to thrive rapidly is apparent, are the common subjects, because any excess of blood is not drawn off by Nature's acts as in older ones. In the first all goes to the formation of blood, but in the older animals pregnancy, the secretion of milk, together with greater wear and tear of the system, are causes which act as the safety-valve, and thus prevent any of the effects of over-repletion.

Black-quarter occurs more frequently at this season than others, from several causes. If the preceding winter has been attended with scanty pasturage, stock generally is limited to smaller quantities of food—in some cases, injudiciously so—and the quality may, likewise, be none of the best. Again, dry fodder forms the bulk supplied, all of which are not in any degree famous for furnishing large quantities of rich nutriment to the system. Besides, cold weather has much to do with the fact that black-quarter cannot take place to any extent in winter; the digestive organs are in greater activity, supplying the elements of heat which the body requires so much. But as soon as the grass grows, forced by warm rains and bright weather, the animal obtains far more nutriment than the organs can appropriate; they become surcharged, the bloodvessels through the body are also seriously overloaded, and the blood itself so very rich, that in various parts beneath the

skin, over the quarters, back, or legs, &c., the vessels give way and allow the blood and lymph to exude, and cover a space of variable extent. If the hand is passed over the parts a loud kind of cracking noise is given out, an effect due to the decomposition of the effused materials and disengagement of air.

Certain pastures, sometimes whole farms, are productive of this disease, and farmers have been ruined in consequence, which circumstances point to the advisability of turning over the ground by the plough, and for a number of years grazing off newer pastures. But in many instances by the exercise of proper care the disease may be avoided without even that course, at least for a time.

Black-quarter, as already stated, is rapid in its appearance. Animals well and hearty at night are found dead next morning, and rarely, even in the slowest forms of attack, are there any particular signs beyond slight lameness or appearance of unusual excitement. To these are quickly added laboured breathing and intense pain, and the creature falls or lies down never to rise again. If the course of the disease is slow and attack slight, the parts affected will slough and form unsightly sores, which heal with great difficulty; and not uncommonly the mouth and tongue are covered with blisters, which after bursting exhibit the same characters.

The treatment of black-quarter is a most difficult matter, as affected animals are seldom seen until it is too late. Blood-letting and purgation should be resorted to at once, where practicable; and if such be successful, in a day or to afterwards, the inevitable prostration of strength must be combated by stimulants, the sloughing sores requiring solution of chloride of lime, &c., to keep down the intensely disagreeable smell which arises from them.

In the way of *prevention*, much may be effected by general management. Young stock should receive a more liberal allowance of nutritious food during the autumn and winter months, by which they will grow and 'develope more gradually, and thus be prepared for the sudden effects of rich and succulent grass at the beginning of spring and warm weather. It is advisable also when the grass of pasture is found to spring rapidly and in large quantity not to allow young stock to graze too much upon them, but rather limit the feeding to two or three hours daily for a time, taking care to have partially grazed pasture to turn them upon for the remainder of the day. Some breeders have practised with success the plan of sending the stock for a walk of two or three miles each day, thus

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creating a demand for the food consumed by the waste occasioned by exercise. Next to these precautions, the use of surgical and medicinal remedies is beneficial. For a great number of years we adopted the use of a long seton in the loose fold of skin (dewlap) in front of the breast, with great success. This was *not* put across, but caused to pierce the skin at the lower third of the neck; the needle armed with broad tape was carried down to the bottom, at least twelve or fifteen inches below, where it remained over two months, causing suppuration, which had the effect of usefully counteracting any tendency to making blood too rapidly. The pain and inconvenience produced also had, doubtless, much to do with the benefit arising from it. Some object to the seton because they consider it spoils the form of the dewlap, but we consider it not only a more effective but decidedly a more honest proceeding than the operation of so-called "nerving," which many quack pretenders recommend, simply because no nerve is found where they search, therefore the affair is a downright imposture.

The rest of the treatment consists of the timely use of a purgative drench, consisting of six or eight ounces of Epsom salts, two or three drops of Croton oil, and one ounce of ground ginger. This we have usually administered at the time the seton was inserted, taking care to keep the animals in the straw-yard for shelter for two or three nights afterwards, if the weather was at all cold or showery. Afterwards, if the tendency to plethora was at all great, we adopted the use of powders of neutral salt, such as the sulphate or chlorate of potash, mixed with linseed meal or bran, one ounce of the salt being allowed for each animal, twice or thrice a week, for about two months. By these means we have succeeded for years in keeping away blackleg from farms, on which previous tenants have been starved out. In order to cause the creatures to take the medicines a little trouble is required, but if it saves the life of one out of a hundred something above an ordinary remuneration is obtained. The salt finely powdered is carefully mixed with five or six times its bulk of bean, bran, barley, or linseed meal, and afterwards thrown amongst green food which has been cut in the chaff machine. This mixture may be put into troughs or mangers in an open shed or farm-yard, where the animals can be taken after grazing upon the fatal pastures, usually taking care to keep them an hour or two previously without food. We have, however, under certain circumstances, used the powders without any removal from the pastures with every success.

POISONING OF SHEEP BY DIPPING.

As each season comes round, and the operation of sheep dipping is necessarily put into practice, we are apprised of deaths taking place, in some instances few, but unhappily, in far too many, great numbers being carried off.

With large, fat, and heavy sheep there is always a great liability to accident, and particularly among ewes that are pregnant. The necessary handling induces a great amount of excitement, and pressure on the lungs becomes so great that suffocation, when the creature is turned on the back, is very easily produced. To obviate this, we do not see why sheep of all kinds, when they need dipping, cannot be immersed in the bath *feet downwards*. A thoroughly practical and scientific veterinarian, Mr. Dickinson, of Boston, Lincolnshire, whose assistants pass through the bath many thousands annually, has for some years adopted this plan. The sheep is placed in a suitable cage, and by a simple lever raised and lowered in the bath, and this means entirely obviates the casualties we have mentioned.

But there are other causes for mortality and destruction of sheep in dipping, besides suffocation in handling, and the most common and fatal is the use of metallic preparations for the cure of scab and killing the parasites that abound in the fleeces. Arsenic and corrosive sublimate are substances which enter largely into the composition of these dipping mixtures, and we learn that a well-known, largely advertised nostrum, which is principally composed of arsenic, was used on the occasion named in the commencement of this article, by which forty animals were rendered lifeless in somewhat less than four hours.

Popular prejudice, fostered by emblazoned show cards and handbills, announces that no other remedy can be used which will destroy the parasites of the fleece; but here prejudice makes a great mistake. Sheep-dipping, like many other operations, is too carelessly and too seldom done, and, as a result, the dipper resorts to a most deadly remedy, which not only kills the parasites, but also the sheep, and thus adds to the annual mortality which we have too much reason to deplore as already too great, and more than we can afford. Besides this, sheep farmers are frequently at fault in turning newly-dipped sheep back to the same pastures and localities which abound in the parasites which torment them; and newly-clipped sheep are allowed to mingle with lambs without any precaution being taken to guard against the passage of the lice, tick, &c., from one to the other. Thus, the operation confined to ewes, only is but a proceeding which

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favours the parasites seeking greater warmth in the thicker and close fleece of the lambs. When ewes are dipped, it would be well to dip lambs also, and in using a compound, that selected, should be one not essentially for bleaching and cleaning the wool, but for its power of attaching itself to the fibres of the fleece, and thus render it untenable by the parasite. There is, however, some difficulty in the choice of materials which will effect this, and more so when the bath is used, as all substances cannot be conveyed in a watery solution. For this reason we advocate the more effective, although slower plan of *pouring*, with which every sheep-farmer is thoroughly conversant. By this many agents, perfectly harmless to the sheep, but deadly poisonous to the parasites, may be used, conveying comfort to the animals, effecting a more speedy cure, and preventing not only the loss of flesh, which is never regained, but also the loss of animals themselves.

BRAXY IN SHEEP.

We gave a brief account of one of the common affections of young stock, viz., "Black Quarter," which belongs to the class of blood diseases, and we have now to notice another, in the same category, but confined entirely to the sheep.

In all classes of animals we find a prevailing tendency to succumb to one form of disease at one period of life, and at a later to one of a different kind altogether.

Thus, young cattle are liable to black-quarter, but the conditions that produce that affection give rise to other blood diseases, as apoplexy of the spleen, and among pregnant animals, another form of apoplexy, which we shall notice at a future time. Likewise, in young animals, the acknowledged causes of black-quarter of cattle develop in sheep the affection known as black-spauld, but older animals contract what is known as braxy.

Among the various signs which characterize the malady, diarrhoea or obstinate constipation form prominent features, and the hill shepherd recognizes the first as dry braxy, the latter as dumb or water braxy. The animals are usually attacked suddenly by giddiness and staggering gait, the head is elevated and he falls forward, and, after convulsions more or less protracted, dies. Sometimes the course is slower, but rarely. The wool sticks or lies flat on the skin, and is harsh to the touch, obstinate costiveness of the bowels speedily gives way to excessive looseness, violent straining, and colic; and in certain instances the cases prove tedious and characterized by lingering fever. Putrefaction goes on rapidly in

the body after death, and its evidences are even present during the last few moments of life. Air is largely present in the first stomach or paunch, also beneath the skin and between the muscles and membranes of the body; and when liberated by the knife it is frequently unbearably from the powerful odour of decomposition by which it is impregnated. In some cases, even before death, air may be detected under the skin by passing the hand over it, when a perceptible crackling will be heard.

After death a bloody froth fills the nostrils and windpipe, and in the abdomen a reddish coloured thin fluid is found. All the organs and blood-vessels are charged with very black blood, and dark red or black spots and patches may be seen upon their outer side. The heart is full of blood, and all the muscles of the body are darker coloured than natural.

Braxy is an affection which, like black-quarter, will pay better in prevention than cure. The sudden nature of the attacks and rapid progress of disease admit of no proper course of medical treatment, therefore it is desirable to attempt a system by which the origin may be arrested. For this purpose in hilly districts more shelter is required, by which the effects of exposure will be considerably mitigated; and in autumn and winter, when natural food is scarce, dry or artificial kinds should be substituted so as to prevent the animals becoming low and weak. In spring and summer, when food is abundant, great caution is required in management; for those animals which are thriving rapidly, especially after being kept low during cold weather, are most likely to be the victims. Likewise, during moonlight nights many are affected, as a result of over-repletion, and during sharp frosty mornings, as an effect of exposure, when the blood is heavily charged with highly nutritious elements. If possible, more exercise should be given to the most vigorous animals, and a proper action of the bowels ensured by suitable food of a laxative nature, and occasional doses of saltpetre, which may be given among bran or linseed-oil cake, &c. Bleeding and purgation, in some instances, are quite called for, and sudden changes from poor to rich food should always be discountenanced. While a system of growth and development is to be promoted by suitable food, it should be induced regularly and gradually, which in the end will prove far more profitable than scarcity during autumn and winter, with a careless and sudden turning upon rich succulent food, at a season when the system does not require so much and is least able to bear a direct overcharging by it.

THE COMMON AILMENTS OF LIVE STOCK.

Among the many affections common to domesticated animals there is none scarcely which has given rise to as much controversy and speculation as splenic apoplexy. Observed only by a few within the past twenty years, it has been considered by others quite a new and totally distinct affection; but when the archives of veterinary literature at home and abroad are searched, evidences are abundant of its previous existence, and careful records shew that scientific men have long been alive to its fatal effects, and no less active in attempting to fathom the cause as well as to solve the problem of cure and prevention.

Like Braxy and Black Quarter there is always present a tendency to sudden and dangerous plethora in all the victims. The best and most active in thriving are first seized, and rarely recover. As stall-fed animals have been most frequently affected, the conclusion first arrived at was that food rich in nutritive elements, supplied in super-abundance, with warm stables, and no exercise—all conducing to the formation of blood too large in quantity and too rich in quality—was the sole cause. So far the conclusion was found to be correct. After death the spleen or milt is found to be engorged with black blood, ruptured, and its structure broken down. Besides, other organs unmistakably exhibited the usual indications of blood-poisoning; and when active measures of prevention were set on foot—when food less nutritious, and suitable medicines were administered, and, in addition more liberty has been given to the animals previously confined too closely, the malady has rapidly disappeared, but always recurred when the same system of forcing has been again adopted. Among sheep too close folding, with similar conditions as to food, &c., the same results have arisen.

The affection is peculiarly remarkable from the fact that the flesh of such animals dying from it is quite unfit as an article of food, and when partaken of by dogs in a raw state it proves highly poisonous to them. If the butcher, in flaying or cutting up the carcasses, should by chance wound his flesh in any part, a rapid and violent death is almost sure to follow; and animals following the victims—cattle or sheep—and grazing where their blood or saliva has fallen, are safe to suffer fatally. From such occurrences, which have now and then taken place, it has not unreasonably been concluded that the disease is contagious or catching. There is, however, this difference; a contagious malady usually reproduces itself in other animals of the same species, but splenic apoplexy does not. A

blood poison of another form is engendered even more rapidly than splenic apoplexy itself.

Since veterinary science has extended so much of late, and men of greater acumen have enrolled themselves in its ranks, observation in connexion with some of the obscure and less known ailments of domestic animals has been encouraged and stimulated; and, as a result of this, we are now able to add other causes besides a highly nutritious food and want of proper exercise, which give rise to splenic apoplexy and its allied form of blood poisoning. Our intimate acquaintance with some of the large grazing tracts of land, especially those lying low and suffering from long periods of inundation, with insufficient drainage, has furnished many instances which prove that the soil has greatly to do with the production of this affection; and, again, on some farms where a system of heavy manuring is practised on the low-lying meadows, such diseases have occurred with regularity and sudden fatality. In addition, also, in such localities the presence of a pure spring or rivulet of clear running water is rare. That which drains from the land is rich in organic impurities and salts, the result of decomposition of animal matter; and the vegetation growing upon the surface of the soil is thoroughly impregnated with the same impure fluid. As a rule, drainage carries off all excesses of this kind; but in the instances we are considering, the want of drainage, with impure and stagnant water in ponds, ditches, or so-called rivulets, militate against the efforts of the soil to unload itself. The soil has a remarkable power of disinfection, by which the rotting or putrefying ingredients of manure are at once chemically altered and the odour destroyed. The sun and air, too, play no less important parts in the work of transformation. The first promotes the destructive process, and the latter dilutes the odour arising from it, at the same time by the ozone it contains, suppresses or neutralizes it. But there is a stage beyond which the soil may not have its corrective influences; it may be so charged, and is being constantly saturated with manurial elements as to be positively poisoned by it. The water draining from it, and the vegetation subsisting upon it are likewise poisoned, and the animals subjected to an existence upon all of them likewise succumb to fatal blood-poisoning. In such cases, the land, to be safe, must receive attention, the brooks or ponds must be cleared, or sun and air over the surface are but so many more agencies for the promotion and propagation of malaria and fell disease. It is quite as possible to overdo the land with manure as to be

guilty of starving worse than the naturally impure as a result of too frequent inundation lime or common other manure system is to possible, or creation of water, close up and put such pastures years. Of course than done; never annual mortality ions, the proceeds practical impossibility saving to the extent. With the present is now a serious whether more land required; and if the breeding and grazing encouraged, as it growing demands of turning over the pastures should be others, hitherto being laid down to ingly. Setting shall always fail to by medicines alone complete that does not of action, and effective as mutual of the sciences of veterinary medicine in the acceptance.

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Among the numerous seize upon our domestic season of the year, is not uncommon. form of disease, with character, mode of with variable temperature known as a cold variety of blindness frequently a great number same locality during from the large area it seems to be spread cult for those unacquainted science to reconcile "insurance that such "not catching."
Certain conditions necessary to give rise to we are about to notice that as seasons are character, there are affection. In moderate weather, or during showery days, the disease but if the sun continues power and brilliance;

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guilty of starving it, and no condition is worse than that in which it becomes naturally impregnated with animal matter as a result of locality, bad drainage, and frequent inundation. Top-dressings of lime or common salt may do good if all other manure is withheld, but the best system is to make the brooks run, if possible, or create a new and pure supply of water, close up all the stagnant pools, and put such pastures under crop for a few years. Of course, all this is easier said than done; nevertheless, if we consider the annual mortality arising from these affections, the proceeding will be found to be of practical importance, and ultimately saving to the extent of thousands of pounds. With the present conditions before us, it is now a serious question with every one whether more land under grass is not required; and if the necessary attention to breeding and grazing be stimulated and encouraged, as it ought to be, to meet the growing demands of our country, the plan of turning over the oldest and most fatal pastures should be adopted in rotation, others, hitherto long under the plough, being laid down to take their rest accordingly. Setting aside these principles, we shall always fail to eradicate such diseases by medicines alone. No system is complete that does not embrace a wider range of action, and none so elaborate and effective as mutual blending of the resources of the sciences of agriculture and veterinary medicine in their widest and fullest acceptance.

BLINDNESS.

Among the numerous maladies which seize upon our domestic animals at this season of the year, ophthalmia, or blindness, is not uncommon. Apart from the usual form of disease, which from its general character, mode of attack, and connexion with variable temperature, &c., is usually known as a cold in the eye, there is a variety of blindness which attacks frequently a great number of animals in the same locality during hot weather; and from the large area of country over which it seems to be spread, it is somewhat difficult for those unacquainted with medical science to reconcile their ideas with the assurance that such a disease is positively "not catching."

Certain conditions, however, are necessary to give rise to the form of ophthalmia we are about to notice; and hence we find that as seasons are not always of the same character, there are modifications of the affection. In moderately cool or gloomy weather, or during alternate hot and showery days, the disease may not be seen; but if the sun continues to shine with great power and brilliancy, if rains are delayed,

and worse still, if there be no shelter for the animals, blindness will often run rapidly through whole flocks and herds. Under these circumstances the grass is arrested in its growth, and speedily disappears; food becoming short, necessitates the continued movements of the animals in search for it; and the eyes are exposed to the effect of reflected light and heat, from which intense inflammation is set up: the products of the action occupying the whole of the interior and posterior chambers of the eye, obliterating the function of sight entirely.

Our ordinary summers are not, as a rule, remarkable for a long continuance of Indian temperature, yet for a few days, in certain districts, the effects are sometimes very severe, and this is most particularly felt upon the white clay, chalk, and light gravelly soils, as well as on the salt marshes, where the light-coloured and bare sandy soil prove as equally powerful in transmitting injurious heat and light; and in such an event cases of blindness are not uncommon. Sheep often suffer very severely, and present a most pitiable appearance by their inability to proceed without assistance, running against each other or the various objects which happen to be in their way.

There is, however, some difference between this form of blindness and that which happens late in autumn, in winter, or during cold and wet springs. The summer blindness is wholly a result of the powerful rays of heat and light transmitted from the light-coloured soil, which is destitute of its usual covering—grass. If there is no opposition to the growth of grass, and the ground is well covered, no harm happens, the colour of such vegetation being wisely ordered as a most useful and effective neutralizer of light. It is only after the soil is grazed close, and it becomes dry, white, and hot by continued sunshine and drought, that such blindness comes on; and it rarely happens that few cases only are seen—the usual course is for the affection to spread over the whole of the parched-up and sunburnt district.

The treatment is simple, and generally very effective. It is best to remove the animals at once to a large barn or a number of sheds, and shut out all the light possible, but at the same time contrive to ensure the requisite air. This may be easily managed by improvising a number of narrow passages, constructed of tarpaulin, &c., and running at right angles with each other, for the purpose of ingress and egress on each side of the building. The next part of the proceedings is to feed on bran and sloppy food, in order to expedite the action of a moderate purge, which should be

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speedily given to each animal. The eyes may be bathed with a solution of sugar of lead, or, what is probably better, arnica lotion, several times a day. On the third day after the administration of the purge, powdered nitre, in the proportion of half a drachm to every pint of water, allowed for drinking, will be found very useful at mid-day. Beyond this little else is required. The animals may be kept up probably a week or ten days; and if the hot weather subsides, rain falls, grass food becomes plentiful, and, moreover if the sight is being rapidly restored, they may be gradually turned into the pasture again, not, however, without having secured ample shelter, to which they may resort in the event of any return of excessive sun and heat. The neighbourhood of a copse, an old building, or even a few hurdles packed with straw, so arranged that sheep may get beneath them, may avert serious consequences, and at this season should be highly esteemed for even a slight and temporary protection.

MEGRIMS IN HORSES.

Among equine animals the consequences of very hot weather are evident in an affection commonly known as Megrims, the nature of which has given rise to much dispute. This may probably have arisen from the fact that certain horses have shewn symptoms of the affection totally apart from the influence of hot weather; and thus neglecting to seek out and identify the legitimate cause, false conclusions have been admitted.

The disease exhibits peculiar phases. Young horses are no more exempt than old or middle-aged ones. The severest exertion is no more likely to cause it in one than the slightest movement in another. In one animal the seizures may be slight—so transient that they may nearly escape observation, while in another the most violent paroxysms are exhibited. We have seen a horse go along with every satisfaction for a few miles, then suddenly stop, stare about vacantly, and proceed again as if nothing had happened. The horse at other times may suddenly pull up, throw up the head and fall on his knees, as if shot. In more violent cases the animal suddenly rushes off at an alarming pace, heedless of everything, pull as we may at the reins, and the mad career is only brought to a close by some dangerous and probably expensive freak, such as jumping into a shop window or down an excavation, if it happen to be in the way. Happily, however, the mad freaks are usually of rare occurrence, and frequent notice of slight attacks induces the owner—wrongfully, we must state—to part from the animal, under the idea that “it is

better to let some one have the trouble and risk with him.” Megrims is a form of epilepsy, and owing to the various conditions which may give rise to it, the attacks are modified, and display such a want of connexion, that considerable latitude is allowed for speculation as to their relationship or identity.

Among harness horses a common cause is said to be a tight collar, or one too large, being drawn upwards by the false position of the points of attachment to the traces, which, causing pressure on the jugular vein, prevents the return of blood from the head. The modern view, and doubtless the more correct one, is that the pressure from a collar really prevents the circulation of blood towards the brain by the carotid arteries; and this is supported by the generally accepted idea of the real nature of epilepsy—an imperfect nutrition of the great nervous centre, the brain. Megrims does not usually affect harness horses with properly-fitting collars more frequently than those never used in harness at all; hence we must look farther for the cause. In animals that are subject to this affection it will be found that a very weak, and even slow circulation is present; there is also liability to congestion of the liver, and during any extra exertion the result may be obvious in slight *vertigo*, or, in accordance with conditions, it may merge into a *parexism* of uncontrollable fury.

Nothing in the way of surgery or medicine should be done for any attack of megrims. The owner must be deaf to every recommendation but one, that is, to take warning by the first attack and resolve to use the animal no longer until the causes are thoroughly ascertained, and proper medical treatment instituted. If the animal does not lose the power of standing, let him be led home at once; if he falls, have the head secured by sitting upon it until the attack is completely over and sensibility has returned, when he is to be taken home as speedily yet quietly as possible. Medical treatment consists of promoting proper action of the bowels, and thus reducing as well as dissipating congestion of the liver. The functions of the digestive organs must be afterwards encouraged by regular exercise, and want of general tone secured by the administration of various tonics and use of wholesome as well as easily digested food. If any faults are attached to the collar or harness, they must be remedied; and with the measures advocated little fear need be entertained of danger arising afterwards. It is only among those animals that are constitutionally wrong, and in whom improper food, idleness, irregular exercise, and probably

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SORE THROAT IN HORSES.

With the decline of temperature more especially if it is alternated with chilly winds, or frost during the night and powerful sun during the day, or continuous wet and cold weather, our domesticated animals are prone to certain maladies which prevail somewhat extensively in certain districts. Among horses, Sore Throat, or Laryngitis, as it is known in medical language, is most common.

With sore throat there is a cough, and at once known as the cough of sore throat by its frequency. The animal if at work stops suddenly, places the nose downwards, often between the knees, and there he will stand for some minutes, while the convulsive efforts as if to dislodge something are very rapid, short, and violent. As soon as they subside, he resumes his walk as if nothing has happened, but it is not long before another attack comes on, and they become so frequent that neither pleasure nor profit comes of using him. Sometimes the same intensity characterizes an attack which prevails in the stable, and when such is the case, the animal is usually at the worst when he eats or drinks. If the top of the windpipe is pressed gently between the finger and thumb, the fit of coughing may be produced at once, and by this proceeding many practitioners decide, after watching for certain other signs; but as a rule it may be dispensed with on the plan of avoiding unnecessary pain.

Besides the constant cough, there will be an increased redness of the membranes of the eyes and nostrils, and the mouth is hotter than natural, and if the animal has not lost his appetite, it is likely he has refused his oats and taken in preference his hay. We have frequently noticed this in the beginning of sore throat, as well as catarrhs and influenza with which sore throat is associated, the solution of which appears to be that, the muscles of the swallowing apparatus (larynx) being affected, they cannot grasp and pass on small particles of food, such as grain, which do not form with the saliva a solid bolus. Hay, on the contrary, after being masticated, is rolled up into a compact mass, and as such is carried to the back of the mouth, where it does not give way under the closing action of the muscles, whose office is to convey it to the gullet and thence to the stomach.

By aggravation of causes, sore throat does not always stop at the point we have described. Considerable swelling and pain takes place among the glands and muscles inwardly, behind the larynx and pharynx, and the large glands on each side

outwardly participate. The animal goes off his feed, and he stands with drooping head and ears, while saliva flows continuously from the mouth, and he looks wretched and miserable. The presence of fever is shown by great redness of the membranes, the mouth is intensely hot, breathing is rather difficult, and as the case proceeds there is a roaring or stertorous noise produced. Sometimes the swelling increases so rapidly that suffocation is apparent, and, to relieve the sufferer, the practitioner at once opens the windpipe, which affords a delightfully easy respiration. In these cases also an abscess may form inwardly at the back of the throat; and we have then analogous conditions to those in the human subject known as quinsy.

The treatment of sore throat in horses is very simple, and to effect a speedy and effectual cure, in the exercise of humanity towards the creature, some great mistakes are made.

Notwithstanding the great difficulty which is evident to all who see the suffering creature, some of the worst means of administering remedies are resorted to, such as cramming a bolus down the throat, or drawing up the head as high as possible, while a draught is poured down the mouth. In the latter case, the fluid being denied passage down the gullet may find its way into the windpipe; if it does so, it is a thousand to one if the animal is not choked. Seeing then these objections to such remedies, we recommend more simple and efficacious ones, such as the following:— If the animal is inclined to drink, and, as a rule, we find thirst present as a result of the fever, let him have water constantly beside him in which some nitre has been dissolved, 1 ounce of which may be put into a pail half filled. If he will take gruel or linseed tea, the nitre may be put in either, but on no account give more than 1 ounce the first day, or $\frac{1}{2}$ an ounce during the second. The throat may be rubbed on the outside (commencing at the root of one ear, descending to the angle of the jaws, beneath and up the upper side to the root of the opposite ear), with ammonia, turpentine, or strong soap liniment. Mustard embrocation or liquid blister are sometimes used with benefit, but all require care, in order not to take off the hair.

In order to ease pain, the tincture of belladonna may be injected beneath the skin; chloral hydrate, and many other remedies may also be similarly employed; and to facilitate swallowing and lessen swelling in the throat, the mouth may be washed out frequently with a gargle composed of 2 ounces of tincture of catechu and 1 ounce of powdered alum with about a

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pint of water. To use this it is simply necessary to elevate the animal's head so as to bring his mouth into a horizontal position, when a portion of the fluid, say a wineglassful, is poured from the bottle upon the tongue. The effect is to cause a movement of the jaws, by which the fluid is carried to all parts of the mouth, and thus comes into contact with those diseased. It is not necessary that this should be swallowed, therefore, after the jaws have been moved, the head may be lowered. It is, however, more effectual to make up a paste by heating the catechu in a small quantity of water, then adding 1 ounce of belladonna extract, 2 ounces of wheat-flour, and as much treacle as is sufficient to make the whole a semi-plastic mass, and a tablespoonful of it should be put on the tongue five or six times a day.

When an abscess is forming at the back of the throat, it is sometimes useful to apply the nosebag and steam the nostrils. A copious discharge from the lining membrane is thus produced, and the parts affected are lubricated, but if the breathing is in the least disturbed, this proceeding may be attended with danger. It should be arranged therefore to have the veterinary surgeon in attendance, in order, if required, to perform the operation of opening the windpipe. If this is done, the animal experiences little or no inconvenience afterwards; the maturation of the abscess proceeds, and discharge is effected without danger; but where due caution is not exercised, and the operation delayed, death frequently follows suddenly.

DISTEMPER IN DOGS.

Chorea is a very troublesome affection, and very rarely cured when allowed to remain too long. It consists of a continuous series of twitching or irregular contraction of the muscles, occasioned by a false or morbid condition of the nervous system.

Some animals are affected differently to others, indeed out of half-a-dozen patients we may observe as many varieties of the mode of attack. When it is in a mild form, the dog may exhibit periods of apparent freedom, but now and then as he stands, one portion or whole side of the body will be suddenly drawn downwards. The twitching may also be confined to one limb only or to both fore, when he appears to be constantly making a succession of bows. Likewise the neck or hind quarters are the principal locality of action, and corresponding jerking takes place.

Another dog is mostly affected when lying down, which causes him to be very uneasy, constantly changing his position and seeking fresh places. When the head and neck are affected, the former may be carried on one side, either drawn round to

the right or left, or twisted so as to present one eye upwards and the other of course downwards. Again, the form assumes a peculiar trembling and shaking, which is as constant as it is singular, and in some dogs the twitchings are so rapid and violent as to cause the animal to shriek and howl from acute pain.

In each form there is a common tendency to degenerate into intractable states, when all kinds of treatment prove abortive, the creature loses flesh and becomes thin, weak, and attenuated, he can eat nothing, nor is he able to take rest a whole minute, and eventually dies of absolute starvation and exhaustion, from excessive fatigue. *Chorea* is otherwise known as St Vitus's dance.

Paralysis, or loss of power, is another of the awkward terminations of distemper. It may be considered as an aggravation of those conditions which give rise to *chorea*. While *chorea* may be estimated as a morbid condition of the nervous system, in which the supply of nervous energy to the muscular system is short, transient, and irregular—the principle by which the individual fibres of a muscle, or set of muscles, are kept under control, and caused to act in obedience to the will, is absent, and thus portions only contract, and so give rise to irregular movements, entirely independent of the will. *Paralysis* is a complete withdrawal of that power or principle, and the result is no movement whatever, and sometimes also loss of sensation entirely.

This may be due to congestion or softening of the brain, or some portion of the spinal cord; but whatever may be the immediate cause, the primary one appears to be loss of nutrition, occasioned by the impoverished state of the blood and other complications which supervene on neglected forms of distemper. *Paralysis* occasionally follows *chorea* in the early stages, but as a rule it appears unassociated with, and totally independent of it, not unfrequently coming on suddenly, and even when the dog has not given many signs of illness, or at least such as the ordinary observer would readily detect. At first the animal appears weak across the loins, and he staggers when walking. The hind quarters sway from side to side, and the hind legs cross each other. Weakness increases, the dog lies much and rises with extreme difficulty, and at length is unable to do so. As he attempts to get up, the hind legs make no effort; the spine is twisted, as it were, for while he may raise up the fore quarters and stand on the feet, the hind legs and hip lie flat on the ground, and in this condition the creature will drag along until the skin is rubbed off the surface, feet, and sides, giving rise to large and

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Surfeit.—By a common form of temper. It is the eruption upon the tends to every part large sores, having to heal, and offensive odour. declines to move sent as well as the appetite at first time it is resumed does not grow thinner day by day creases, under cumbs.

The treatment an affair of great happens that such much internal disease has taken place; may be said to be *Chorea*, even in the leaves the dog less sickly, weak, work afterwards. conditions are present from it he is so much that if he is shot proves the most humane. The depends upon a variety—indeed a blood disease about as much as preceding disease are favourite dogs and valuable breeds that at least made to cure, how may appear. Under many cases are taken are carried through remitting attention

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obstinate sores. Besides this the fæces and urine pass away without effort on the part of the dog, and unless scrupulous care is observed, there is additional cause for severe irritation of the skin, and great discomfort, from accumulations of noisome filth.

Surfeit.—By this is known a somewhat common form of disease which follows distemper. It is truly eczema, or a pustular eruption upon the skin, which shortly extends to every part of the body, forming large sores, having little or no disposition to heal, and giving rise to a sickly and offensive odour. The affected animal declines to move, as great stiffness is present as well as extreme pain and soreness, the appetite at first is absent, but after a time it is ravenous, yet all the food consumed does no good, the animal becomes thinner day by day, and weakness also increases, under which it eventually succumbs.

The treatment of these several states is an affair of great difficulty. It rarely happens that such conditions appear before much internal disorganization of structure has taken place; animals in these states may be said to be three parts dead already. Choreia, even in its mildest forms, seldom leaves the dog uninjured. He is more or less sickly, weak, and always under his work afterwards. In paralysis even worse conditions are present, and if he recovers from it he is so much the worse an invalid, that if he is shot at the first, it generally proves the most profitable as well as humane. The skin disease, doubtless, depends upon a vitiated state of the blood—indeed a blood poison, and this leaves about as much chance for recovery as the preceding diseases; nevertheless, there are favourite dogs and others of peculiar and valuable breeds, and owners are desirous that at least an attempt should be made to cure, however shadowy the result may appear. Under these circumstances many cases are taken in hand, and animals are carried through safely by means of unremitting attention and determination.

Among the list of remedies absolutely necessary, perfect quiet and absolute cleanliness are prominent, and in the way of medicine tonics are of great service. For choreia, quinine, iron, and nitrate of silver are usually given in small and repeated doses, being frequently alternated with each other. In paralysis, calomel and opium, or the blue pill with iron, answers very well, taking care to unload the bowels periodically by enemata and gentle aperients. In the skin affection, solution of arsenic is the main remedy, while at various periods quinine and iron are essential. Lastly, if the animal will take food, it should be

highly nutritious, given frequently in small quantity, and with as much variation and change as possible; it should not be allowed to remain within sight or smell, and always after being refused removed from the presence of the patient.

DROPPING IN COWS.

There are several conditions which give rise to an inability to stand, or rise when lying, but which have been so commonly confounded with each other, that whenever a cow is said to have dropped at or about the time of calving, but one view is understood or expressed. She is said to have "milk fever," which term is also in general use with, and understood to be the same, as "the drop," "loin fallen," &c. However, by a study of causes as well as the nature and signs of the maladies themselves, veterinary practitioners are now able to distinguish three separate forms of disease which produce dropping at the time of parturition, each of which we will attempt to describe.

Nervous Debility.—This title is very expressive of the nature of the affection. The cow most likely to be affected is that which has not been very well kept, or, from other causes, is not in very strong and vigorous condition at the time of calving. We have frequently witnessed this form of disease in cows travelled about by dealers, and those farmers who keep theirs late on poor pastures without additional food, as hay or cake, in sufficient quantity, when, at the same time, they have milked largely and almost up to the time of calving. Previous diseases, as diarrhoea, debilitating colds, &c., overdriving, and all causes which tend to lower and reduce the vital powers are the means by which this affection is brought about.

Nervous debility is apparently due to functional disorder alone, as the usual course which it pursues, and almost entire absence of fatal tendency indicates. Cows that have had a bad time of calving are not necessarily victims, indeed, such are very rarely affected with this form of the drop. There is no fever, insensibility, nor wildness in the look of the animal, but the creature rests well in a natural position, and is as lively and attentive to all going on around as she can well be. The bag is soft. Milk is present in fair, or even large quantity, and readily withdrawn; the appetite is seldom affected, but constipation may be present to a slight extent, and the rumen is generally full, but not impacted. The pulse is tolerably full and soft, but the circulation is slower and weaker than usual, and the skin is cold. The ears and extremities also indicate the same want of tone and activity in the circulation. Large-bodied cows, and especial-

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ly those that are heavy milkers, whose internal organs are also large, making a great demand upon the nervous system, together with those breeding from large bulls, are likely to be seized, if the general condition is suffered to fall below a requisite standard; hence we find this affection give way, on well-managed farms, to others, which we have yet to describe, having very fatal tendencies. Peculiarity of season, as long-continued wet and cold weather, may influence the production of the complaint, by causing a scarcity of grass, and thus the body deprived of a proper quantity of food, falls below the normal tone, and temperature is deficient; and these, in the end, impair the functions of assimilation, nutrition, and growth. A cow, when in calf, requires a very large increase of food, in order to provide suitable nourishment to the young animal; but if this be not supplied, her own body has, in a great measure, to supply it, and consequently, we find she becomes poor and weak, while the calf may be born healthy and well nourished, if the state of affairs be not allowed to go too far.

There is yet one particular which the owner may wisely bear in mind as a remarkable feature of the disease, and by which he may readily distinguish it from all other affections happening at parturition. The cow can suckle the calf well, and cannot bear it out of her sight, and all general appearances favour the assumption that nothing at all is the matter with her except her inability to rise. In other forms of dopping after calving, as we shall hereafter point out, no such peculiarity as this exists. It is therefore valuable as a distinctive sign of parturient nervous debility.

We have now to notice the means usually employed in order to bring about a return of that nervous tone and muscular power. If the stomach be heavily loaded, and more especially if the bowels be also constipated, it is necessary to give a little opening medicine, but active purgation must be avoided, or the animal may be rendered weaker than she is. Let us suppose for an ordinary dose, we should give the cow $1\frac{1}{2}$ lb. of Epsom or Glauber salts. In the case we are describing we should recommend that only 1 lb. be given, that is, reducing the ordinary dose one-third. With this should be combined 2 ounces of ground ginger, and the same quantity of ground gentian or colombo, and 2 lb. of treacle, the whole being mixed with 2 quarts of warm water, having a handful of flour thrown into it and well stirred.

In drenching the animal care must be exercised. The head must not be held too high; the fluid must not be poured too

rapidly or in large quantity down the mouth. Do not hold the tongue, but allow it free liberty, and give her ample time to swallow each draught before another is administered. The next thing to be done is to give an injection of warm soap and water. It should not be higher than 100 deg. Fah., and not more than 1 quart given at once, but repeated every two or three hours until the bowels are proved to be responding. Small clysters are best, as they do not promote discomfort as large quantities of fluids are apt to do.

Further medicines are not required for at least eight hours, therefore we would recommend that the calf be allowed to draw the udder regularly, or, if inconvenient, milking by hand must be resorted to frequently, say four or five times in the day. This is also important, as nothing disturbs the cow so much as having milk, and being unable to discharge it after having accumulated. In the meantime, also, warm rugs may be put over her back, or in their absence dry sacks will answer the same purpose, and these should extend upwards over the neck; afterwards straw may be heaped over her, and in this way resting with only the head visible she will become warm and comfortable. Some practitioners follow the plan of passing heated smoothing irons over a cloth placed longitudinally on the spine. We have tried this also with marked benefit, and gladly recommend it to our readers. The object is to promote warmth and circulation in the neighbourhood of the spine, and so nourish the nervous system in that locality.

Subsequent medicines are sweet spirits of nitre, 1 ounce; ground gentian, ginger, or colombo, of each 1 ounce; tepid water, 1 pint. This may be given three or four times a day. The food must be light and nutritious, consisting of scalded oats or barley, malt mashes, green clover, grass, roots, &c., as they can be obtained, and these must be supplied frequently and in small quantities at once. If she refuse any portion, it should be taken from her sight and not offered to her a second time.

Cows in this affection recover at variable times. In some cases they are down but a few hours, but if remedial measures are delayed, a day or two may elapse before the cow rises. As in all other complaints, early treatment in this is most successful.

Puerperal Fever.—The second form which occasions dropping at calving is named "puerperal fever;" it is the true "milk fever" of cows, and it is likewise known as "puerperal peritonitis," and "metro-peritonitis," terms which are of greater use to the medical man than to the proprietor of stock. We shall continue to use the term "milk fever" throughout the whole of

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this article, not only for the sake of ease and simplicity in description, but also for clearly defining the differences between this and other forms of dropping at calving.

Milk fever is generally seen among cows that have had a difficult time in calving. When the calf is large, pains are strong, much force is used, and many hours are occupied in delivery. During such cases there is much opportunity of damage in the walls of the womb by extraordinary efforts to expel the calf; inflammation of the blood-vessels follows—phlebitis, together with the various tissues of the organ, which is of the nature of erysipelas. The covering of the womb—peritoneum, an extension of the same membrane which lines the abdomen throughout, as well as forms a complete investment for the intestines and all other organs of the abdomen, likewise partakes of the same disease, and this extends, more or less, frequently proving fatal to the animal.

When the membranes—placenta, happen to be retained too long after calving, they are likely to give rise to milk fever; decomposition taking place, the dead and putrid elements are absorbed by the mucous surfaces of the womb, and thus a poison is carried into the blood vessels. Sometimes the discharges from the uterus may be re-absorbed and produce this; such discharges, we wish to point out, as are the result of morbid action, itself the offspring of the effects of difficult labour.

Cows of all ages are liable to it; over-driving and exposure, together with bad feeding and management are fruitful causes, as engendering a state of system in which erysipelas is most readily produced.

The signs of milk-fever are very remarkable, and when once accurately noted, may be easily remembered. It rarely appears before calving, but mostly appears soon after, and the fatality or mildness of the disease may generally be estimated by the time at which the animal first appears to be attacked. Early cases are generally the most severe, of longest duration, and most fatal; the longer the cow remains free from the attack the more likely she is to have the disease in a mild form and recover early. The usual course is for the signs to appear within a few hours after delivery, but many cases are delayed even until the third and fourth day. In the first instance, the signs rapidly follow each other; in the latter, they are slow and gradual, and seldom gather the intensity to be seen in the first.

The early symptoms are defective appetite rumination has ceased, and the milk has diminished largely. The cow is restless, and wanders about, moaning plaintively. There is evidence of fever, as cold legs, hot

mouth, and increased temperature at the roots of the horns. If the thermometer be passed up the rectum, an increase of animal heat is shewn by it also. Pains begin in the abdomen, and the cow switches her tail, stamps, and kicks at the belly with the hind legs. She turns the nose frequently to one of the flanks, moans and tries to lie, but evidently does this as carefully as possible often remaining some time on the knees before finally settling down. When she rises the same peculiarity may also be noticed. As the case proceeds, pain becomes more constant and acute; the bowels are confined, the pulse is rapid, and possesses no volume, but is small and thin—like a wire beneath the finger; the paunch swells from the formation of gas inside, and the cow strains violently; the head is thrown from side to side, and shortly she becomes insensible, when death speedily follows.

After death we may observe the uterus is inflamed throughout its structure, and besides large quantities of straw-coloured material being present, pus is not unfrequently found, with here and there large patches of dark red, purple, or even black patches, and a chocolate-coloured fluid, sometimes in tolerable quantity, inside. The same conditions apply to some other organs of the abdomen, and the brain is found to be congested, as a result of the blood poison engendered late in the stages of disease.

In the treatment of the disease great reliance is to be placed on *early bleeding and purgation*; but this must be regulated entirely by the state of the pulse. If insensibility have set in, and the volume of the artery is small, beats weak and rapid, no good is to be effected by bleeding; it will only then hasten death. When the artery is full and the pulse is beating hard and vigorously, then we may bleed and purge with advantage. The quantity taken must not be regulated by the size of the beast, but by the pulse. While the blood flows the finger should be on the artery, and, waiting for the first signs of diminution and weakness, the operator should be occupied by nothing else, that he may be ready to close the wound and prevent fainting.

The purge should be a brisk one, an extra quantity of salts being employed, say one-half or two-thirds more than for a mild dose, with which 2 or 3 ounces of ginger and 2 lbs. of treacle should be mixed, and the whole washed carefully down with at least 3 quarts of warmed ale. Injections of soap and water are to be given every thirty minutes to promote the action of the salts, and the skin should be sponged with tepid water, and three or four men set to work to wisp it down with soft haybands

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until proper warmth and circulation are established, after which the animal may be left for two or three hours covered with sacks and straw heaped over her body.

By this time a veterinary surgeon has probably been called, who will conduct the future treatment of the case; but if such assistance is not forthcoming, we may advise the following draught:—Acetate of ammonia, 4 ounces; nitric ether, 1 ounce; tincture of aconite, 30 drops. Great care, however, is required in the future use of this remedy, as awkward results are not uncommon in the hands of strangers to medicine. It will be safer to omit the aconite, and persevere with the acetate of ammonia and nitric ether every four hours, until the pulse becomes slower and fuller, which, together with the return of circulation, warmth, and usual cheerfulness, may be estimated as very favourable signs.

When it so happens that blood letting is not admissible at the outset, the purge should be given only, the rest of the treatment as detailed being carried out; and when insensibility has set in, the medicine must be passed down the gullet by means of the probang or stomach pump, as any other means will choke the cow at once.

When pain is severe and constant, some relief may be obtained by injecting various fluids beneath the skin, as tincture of belladonna, chloral hydrate, &c.; indeed, this promises to become one of the most useful branches of practice, and by which greater results follow than by any other known method.

Apoplexy of Parturition.—The third form of disease to which cows are liable at the time of calving is known as parturient apoplexy, or parturition fever. It is an affection totally different from the two preceding kinds which we have already described, in no point whatever agreeing with them, and therefore, should not, as is too frequently the case, be mistaken for one of them.

The points of difference most to be relied upon are as follows:—It never attacks cows in lean or poor condition that are bad milkers, but is common among those that are prone to lay on flesh rapidly, regardless of breed, and more especially if they are heavy milkers. At one time it was thought that cows of the most improved breeds were only the subjects of the malady, but later investigations have decided that as among them are many that are worthless for the dairy, the supposition is groundless. With regard to age, heifers at the first and second times of calving do not suffer from this kind of fever. It appears that the system must have reached a stage of almost completion in development before it is liable to it, therefore, we find that cows

suffer most at the third and later periods of parturition; and it is also a fact worthy of note, than when an animal has once been affected and recovered, she is likely to have a second attack at the next parturition, and that is almost sure to prove fatal; in fact; the losses from attacks of parturition apoplexy are not less than 95 per cent.

It is also remarkable that this disease does not follow abortion, premature labour, flooding from the womb, retention of the afterbirth, or when the process of calving has been prematurely long, difficult, and tedious; all of which, it appears, being causes which operate strongly in limiting the tendency to it. Parturition apoplexy is undoubtedly a blood disease, partaking of the same nature and characters as "black-leg," and various other forms of blood affections, which have already met with some notice in these pages. It is due to high feeding, especially when the practice is attended with close confinement, and still more so when the cow is naturally a heavy feeder and milker, and likely to make much blood. Easy-tempered, docile animals, and those that will make flesh even on poor kinds of food are favourable subjects. It is reasonable to suppose that as long as such an animal has inside her a large growing calf, demanding much nourishment for its flesh, bones, and numerous organs, the system of the mother knows no inconvenience; but vital processes once fully established are not suppressed in a short time, and the various organs cannot rapidly accommodate themselves to sudden changes; it, therefore, happens that, as soon as the calf has reached the stage necessary for its expulsion, and no longer makes such demands upon the mother, the large supply having not diminished, the whole of the organs are flushed with blood highly charged with rich materials, and the brain being foremost among the sufferers, its vessels often give way and burst, and death inevitably follows after some hours of extreme violence, during which the creature is unconscious.

The victims of this affection are not unusually attacked and even die before calving, in which case it is severe, and seldom extend over thirty-six hours from the first observed sign. Generally many hours proceed before the owner or attendant discovers anything wrong, and in this way much mischief is made, and when at length the cow becomes excited, the eyes are staring, and she shakes her head frequently; if she walks she appears weak, and staggers as if the loins were at fault, and shortly the hind legs double beneath her weight, and she falls awkwardly to the ground, having no power to put herself into a natural or comfortable position. All

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other signs now come on in very quick succession. The eyes are bloodshot, and blindness follows, and the head is thrown from side to side with such violence as to cause the horns to slough, and sometimes to fracture also the bones within; and thus affairs go on for twelve hours or more, weakness becoming greater, and death taking place sometimes suddenly from suffocation. After death the windpipe is often found full of half-digested food, which has passed up the gullet to the mouth, partially as a result of pressure and probably withdrawal of nervous power, and during the heavy inspirations is drawn towards the lungs. The third stomach is also full of hard masses of food, and the bowels are more or less involved. The brain is heavily charged with blood, and frequently large quantities of clot are found at its base, extending to the spinal cord. The bladder is full of urine, and sometimes bursts under the pressure and large quantity; it should, therefore, always be the practice to empty the organ by artificial means as soon as the cow is down, and also frequently afterwards, that such an event may be avoided.

The cure of parturition apoplexy is a most uncertain affair, except in those instances where a practitioner happens to see the animal before she is down, and, having discovered the first signs, while the pulse is full and strong, he abstracts blood largely, and succeeds in moving the bowels by purgatives.

It is of no use trying homœopathic measures here, in a dose and a half, at least, of medicine, should be given, salts forming the basis, with which a few drops of croton oil and 2 or 3 ounces of ginger and treacle, as already detailed, are added.

Clysters of warm soap and water are of the utmost importance, and should be used every half-hour until the bowels are moved. The body requires warmth, and it is well to apply smart friction after the skin has been sponged with tepid water. In giving the medicine, the same care is required as in milk-fever to avoid choking, and as soon as any indications of insensibility are evident, stomach pump or probang must be used instead of the bottle.

After a full purgative dose has been given and other details are carried out, such as making the animal as comfortable as circumstances permit, she may be left in the care of an attendant for a couple of hours, at the end of which 2 ounces of sal-volatile spirits may be given in 1 quart of cold ale, in which an ounce of ground ginger is stirred. This dose may be given every four hours until the animal either recovers, or shews indications of no improvement or rapidly increasing weakness and insensibility. Repeated bleedings are

not at all a wise proceeding; if the first large abstraction has not reduced the tendency to apoplexy, a second will only hasten death: the only possible good that can be obtained is by the use of the stimulant already named.

THRUSH IN HORSES.

By this term is commonly indicated a dark-coloured or black and offensive discharge of fluid of variable consistency from the frog. In some localities it is called thrush, running thrush, &c., and many carters and draymen use the expressive though inelegant term, "rotten frog." The condition in which the several parts are observed, when suffering from the disease in question, is somewhat as follows:—The cleft of the frog, *i.e.*, the triangular fissure extending from about its centre, backwards to the heel, is deep, open, ragged, soft, spongy, and tender. If the finger is inserted with moderate pressure, it may be caused to penetrate beneath the horny frog, portions of which may be raised from the sensitive surfaces beneath; and when withdrawn, the odour imparted to the finger is most offensive and characteristic of decomposing bony matter. Usually simple thrush consists of a mere crack, through which the discharge flows irregularly, but as described already, it is of an advanced stage; and beyond this a third variety consists of disintegration of the whole of the horny frog, with burrowing of matter beneath the horny sole, and considerable lameness. The disease originates in the secretory organs of the sensible or fibrous and fatty frog, and this prevents the formation of sound horn for a covering, the whole process becoming eventually one analogous to that of sloughing of soft parts, in which more or less solution or decomposition of horn takes place, and gives the characteristic odour of the disease.

The causes of the disease are various, *viz.*, presence of moisture, together with such matters in solution which have a softening and solvent action upon the hoof; irritating substances acting upon the exposed sensitive structures, and malpractices in shoeing which tend to remove the frog from exercise of its natural functions. We will consider these in the order given. The prevalence of thrush among colts and horses turned upon wet pastures and into straw yards standing in much moisture, is well known. The softening effect of water is acknowledged by all who deal with their feet, as is proved by the ignorant groom and farrier who make use of stopping, &c., that the process of paring may be more easily accomplished. Practical test, however, fully supports scientific conclusions in reference to this point; hence we accept without doubt, that, in order to pre-

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serve hoofs in a state of soundness, and in their best capacity as a protection and weight bearers, they are best preserved in a state of dryness and hardness as much as possible. Water softens the hoofs and destroys their physical properties, and thus they fail in their offices. But the conditions are still worse when water or moisture, to which they are exposed, contains such ingredients as possess a solvent power on the hoof; therefore, we always observe that horses turned to grass for any time, or into wet straw yards, come up with diseased frogs or thrushes. The reason is obvious. The moisture and wet of these places contain a large amount of saline matter in solution, as ammonia, potash, and soda, and these act powerfully upon horny substances. In order to test this fact, let our readers make a solution of soda or potash in water, and put in a broken horn comb, or portions of an animal's hoof or horn, when they will find after a few days, in accordance with the strength of the solution, that the substance becomes soft and gelatinous. The same effect is produced when horse or cow dung is used as a stopping, and also when the animal is allowed to stand in his own manure.

The secondary effects of these substances are those of irritation, for as the frog is softened, it becomes more porous, and absorption more complete; and when decomposing matters surround the foot, they act powerfully upon the sensitive parts which eventually are exposed; besides, sand, grit, and other solid substances also find their way through the various openings, and become mechanical agents of disturbance.

The third cause of thrush is the use of high-heeled shoes, allowing the horny heels to become too high, and paring away the frog, all of which faithfully remove the organ from the great pressure which, as a natural cushion, it is intended by Nature to bear continually. Loss of function, or idleness and inactivity on the part of any organ brings on disorder, and that state only precedes disease. In this condition, moisture and alkaline solutions, as the water of straw yards and ponds into which drain the manure of the farm, only are needed to make the frogs as bad as they possibly can be; and when such are continually applied, together with bad management, generally in feeding, &c., we may expect to see the disease extend upwards to the legs, giving rise to complicated states. The whole foot becomes involved, first the soft, and secondly the hard parts, and the disease becomes *canker*; and it goes up the leg, the skin exhibits the principal signs in the shape of swellings and

pustules, and confirmed *grease* is the result.

Thrushes do not produce lameness in their simplest states, but the frog is tender, and the animal will wince under pressure from the pincers, or when the part comes upon a loose stone on the road. When they become aggravated, decided lameness follows; and although it may appear insufficient to call for absolute rest, there is nevertheless great pain and inconvenience, and the process of cure is much facilitated by its being carried on in conjunction with cessation from work, at least until considerable improvement is made and tenderness removed, when pressure and contact with the ground is productive of great good.

When the disease is limited in simple thrush a single crack or opening in the cleft of the frog, the course is very plain. First, clear out the dirt carefully with the back of the knife, and pack moderately tight into the fissure some tow saturated with the following mixture:—Sulphate of zinc, one part; acetate (or the sugar) of lead, one part. These are to be reduced to powder and put into a small dish or cup, and covered with either sulphuric, nitric, or hydrochloric acid. A mixture of the first and second appear to be most useful and powerful. Usually one of two dressings are sufficient, but if needed, they may be repeated once in three days, the old tow being removed each time. In severe cases the ragged portions of horn may be detached before the dressing is applied, and it may be advisable to dilute it with one-fourth of water, especially when the sensitive frog is exposed. If matter has burrowed, horn must be taken away to the full extent, and poultices applied for a day or two. In addition, a dose of purgative medicine will be of great service.

QUITTOR.

The disease which we are about to describe under the above name, is principally confined to the heavier breeds of horses, and prevails to a greater extent during the winter time, than at any other season of the year. Quittor consists of a wound in the coronet, or band of flesh immediately above the hoof, which from the nature of the surrounding parts, having a tendency to assume a chronic or long standing condition, exhibits an unhealthy appearance, and by means of so many sinuses or pipes, discharges matter of variable consistency. The causes of quittor are pricks in shoeing, treads from the opposite foot or feet of other horses, bruises, &c.; but the most common cause is the infliction of a wound by the sharpened heels of the shoe in frosty weather, when men are not sufficiently

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careful in turning or backing the animals.

From whatever cause quittor arises, there is always, in the first place, great swelling and hardness, and this condition of inflammation proceeds for some time without any definite signs of dissipation, while the animal becomes unable to set the foot to the ground. During this protracted and unsatisfactory stage, there is much damage going on. There is no tendency for inflammation to localize itself and be confined to the coronet or top of the hoof, but, on the contrary, it spreads throughout a large space among the tissues of the foot, destroying much of them, and by the time that matter or discharge issues from the coronet, there are a dozen different sinuses or pipes leading to the outer opening.

Nor is this all: in addition to the destruction of the soft parts, the hoof and bone are doubtless involved. The latter takes upon itself a species of extra production, and on the surface of the part affected within, there grows a large tumour, which, on account of the space it occupies, invades the substance of the coffin-bone, and gives rise to a corresponding depression. The cure of quittor may proceed and apparently end well, but at some distant day this horn tumour produces inconvenience, and may even render the animal useless.

When horses are being shod, more particularly sharpened or "roughed," in winter, the haste with which the work is usually accomplished forbids the exercise of so much care as the importance of the operation and value of the animal imperatively calls for. Nails will sometimes bend, or "kink," as the farrier has it, after they are partially driven, and thus the bulging part presses severely upon the internal sensitive structures. The same also takes place when nails pass in too close proximity to the same tissues. At another time an old stump is left in a former nail passage within the hoof, and when a fresh nail is driven by the farrier it may pass, of course without his knowledge, between the stump and sensible parts, and thus produce unbearable pressure. An old stump left within the hoof may likewise direct a fresh nail at once towards the inside, and so prick and wound important parts. Sometimes it is withdrawn, and driven again; or, after wounding the sensitive structures, passes outwards, and in each case, no suspicion having been aroused at the time, the animal goes to work, when shortly he becomes lame, and if the cause is not found out at once, the result is great pain and inflammation, succeeded by the formation of matter, which, if not liberated from below, finds its way, by accumulation, and destruction of tissue, to the top, when it is discharged from a

number of pipes, which converge into one or more openings as the case may be.

The cure of quittor is variable: it entirely depends upon the stage at which it is commenced, and the amount of damage already done to the parts. Sometimes the bones and lateral cartilages, as well as the coffin points, are so diseased, that if the animal is treated, although the quittor disappears, either ringbone or sidebone appears, and eventually renders the animal useless. If the case is seen as soon as the wound has been inflicted, little more than a poultice and cooling medicine is required. If the coronet has been cut and bruised by the pointed heel of a shoe, carbolic acid dressing is a most valuable remedy, as by it the tendency to form matter is arrested, and possibly the animal may go to work again in a day or two.

If the animal has been pricked, or bound by a nail, the offending agent must be at once extracted, and accumulations of matter, evacuated from the edge of the sole of the foot.

The quittor, arising from a cut or bruise at the top, is essentially of the same character as that caused by suppuration from nails or corns, &c., and when the sinuses are fairly traced in all their directions, it is a good practice to open them up from their very bottom, by means of a surgical knife known as a bistouri. Veterinary practitioners usually furnish themselves with different kinds of these instruments, the best of which, the bistouri caché, being formed not unlike a pair of scissors, is so constructed that when it passes to the bottom of a sinus, by pressure upon the handles, a blade is exposed, and in withdrawing it the sinus is cut open from one end to the other. This procedure stimulates the parts to healthy healing action. Another plan is to eat out the sinus by caustics. This consists, of passing solid arsenic or corrosive sublimate down the passage and binding a poultice over the foot. If care is exercised, the animal may do well, but there is danger of injuring the joint. Some practitioners pass a pointed piece of iron, at a white heat, through the parts, and when properly managed, rapid cure is frequently effected. A more cleanly remedy is the injection of a solution (1 part to 8) of corrosive sublimate into the wound, and using an astringent lotion afterwards. In all cases, the animal should rest during the severe stages of quittor, and pressure must be taken from the parts by the application of a bar-shoe.

TETANUS OR LOCKED JAW.

Those diseases generally fatal to mankind and also likely to be fatal to the horse, in fact, all diseases affecting the nervous system are more to be dreaded than any other

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species. Tetanus is by no means confined to the jaws alone; the locking of these is merely the result of the tetanic affection, and is termed Trismus.

Tetanus is a univocal spasm, producing rigidity, and every portion of the system partakes of the disease, but particularly so do the bowels, the muscles, and the brain. This disease, so awful in itself and so dreadful in its termination, is sometimes caused by long exposure to cold, or standing tied up in a stall with the rain coming down on to him through the roof; by a severe blow of a stick on the backbone or head; by being pricked by the smith when shoeing, but most frequently by the horse gathering a nail or a peice of glass in his foot, and indeed often by the subsequent treatment for these injuries, no doubt pursued with the best intentions. We now allude to the common practice of pouring into the wound powerful astringents, such as arsenic or muriatic acid. We cannot sufficiently deprecate the use of these agents when thus made use of, and are surprised at any horse on which they are used, escaping serious injury.

The horse will invariably, says Mr. Swift in the *Western Farm Journal*, shew tetanic symptoms twelve or twenty-four hours previous to the jaws becoming set, and if he is properly attended to, at this stage, the fatal event may be averted. The symptoms of tetanus are, wild and frightened look, limbs propped and inclined to spraddle, the tail stiffened, and, like the head, stuck outwards; the nostrils will be distended, the pulse irregular, and, owing to the abdominal derangement, the bowels are highly costive.

You must now find out the cause of all this trouble; if it be a prick of a nail or any other punctured wound, or a stone bruise (now bear in mind the disease may set in after the lapse of a month or six weeks from the time of injury), then dilate the wound or open the bruised part and give vent to any matter that may have formed. Poultice the part continually for three or four days; administer an active purgative, such as calomel, if your patient be plethoric, but not otherwise; keep him comfortably housed, and allow no one to approach him except the one in the habit of caring for and feeding him. This person should carry out the instructions as to the subsequent medical treatment, which must be of such a nature as to soothe and quiet the nervous system. If the horse be a valuable one and worth the expense of the medicines, you may give once a day 3 to 4 grains of atropia mixed with a little honey, on the tongue, also 10 to 18 drops of hydrocyanic acid, morning and night; let the patient have anything to eat that he

will; let him have continually before him some bran or hay tea, and some nice sweet hay. It is well to keep him nibbling. And now we must turn our attention to supporting nature in an artificial manner; this we may assist in by giving nourishing clysters three times daily, composed of strong beef tea, oatmeal gruel and boiled flax seed, and every second day throw up the bowels a quart of linseed oil. This will tend to relax the bowels.

You may now wait patiently ten or twelve days, and if the horse survive that time, you may begin to calculate on his recovery; but whilst the rigidity of the muscles prevails you must still attend strictly to the above mentioned régime. When you perceive a marked change for the better, leave of the atropia, as it is so expensive, and substitute a dose of hydrocyanic acid.

Presuming that your patient convalesces, it will be some considerable time before he can, with safety, be returned to his former work, as his constitution must be shattered, and he will be more susceptible to other diseases, so we should recommend at least eight or ten weeks' quiet rest, with liberal food and tonic medicines.

CANKER OR CANCER OF THE FOOT.

There is probably no disease to which the horse is liable, that presents such obstinacy and intractability as canker, or cancer as it is sometimes named. At the same time, there is scarcely one which proves more annoying and disgusting; but fortunately such cases are now rare in comparison with their prevalence twenty years ago. This much for improved breeding, but more for improved management; and now we trace the origin of canker almost in every instance to neglect and ill-treatment among the horses of poor and wretched owners, who house their animals in any out-of-the-way place.

Whatever may be cited as the principle and most predisposing causes, we cannot name any more powerful than the prevalence of filth, want of ventilation, and general bad treatment of horses of low, coarse breed, among whom canker is most common. Occasionally, however, the disease has excited no small degree of surprise by its appearance in one or more feet—generally the hind—of a well-fed and cared for, as well as better bred, animal; but usually the cause in the end is discovered to arise in some defect in constitution, while attendant gross carelessness somewhere characterizes the stable routine. Some owners, and also carters, or horsekeepers, are peculiarly susceptible of these cases. We well remember a man whose occupation was that of a carrier, and who, frequently putting his horses into different stables on his

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way, was almost continually annoyed by grease or canker among them. Some went so far as to assert that contagion alone developed the consequence, and when he sought to avoid them by changing his horses, he proved no less free. At length he gave up his travelling life, and settled down to work in his native town, after having sold his stock for horses of a different kind. Then the care of them came more immediately under his own eye, and with that canker and grease disappeared from his stables altogether.

Sometimes when, after an injury has been inflicted on one foot, filth is allowed to prevail, canker will ensue and be confined to that foot; but as a general rule, more than one are affected at the same time. From various causes the hind feet are the most liable, as the legs are, to a variety of diseases rarely seen in the fore, and in this way bad constitution appears to have some part in the cause, while we know also that a weakened circulation exists in these parts, and wet, dirt, and filth have therefore more powerful influences.

In ordinary cases, canker commences at or near the frog, and shortly spreads over the whole surface of the sole. In other instances the sole, or sensible lamina beneath the wall, are the parts first affected; but wherever the origin is, but little time elapses before the whole under-surface of the foot is involved in one mass of spongy, soft, and offensive fungus, which grows as fast almost as it is cropped off, and discharges a black fluid, having the characteristic odour of absolute rotteness, which will not leave the hands after repeated washings; indeed, horses with canker may be detected many yards off, so powerful is the odour which escapes from the diseased parts. This odour is even given off from apparently healthy feet of horses, whose constitution is predisposed to canker; and it has been observed repeatedly that such animals need only the contact of filth, and to be neglected in feeding and other matters, to ensure the appearance of the disease. Another peculiarity consists in the fungoid growth being highly charged with blood, so that on the application of the knife, or if the parts are roughly handled or bruised, a free and copious hæmorrhage will take place, and materially interfere with all curative operations. Such cases when neglected always end fatally, as constant absorption of the secreted matter from the diseased parts eventually creates a blood poison, and the animal then succumbs from putrid disease.

In the treatment of canker the greatest patience and perseverance are needed. For a time the foot or feet appear to improve very nicely, the fungus disappears, and

horn comes up apparently dry and sound; but suddenly when the parts are exposed, a fresh place has broken out, and shortly the whole sole is again involved. On this account it is not safe policy to rely solely upon one remedy or kind of dressing, and many practitioners have always several made up at once, so that this rule may be more strictly observed. The frequency of dressing is another feature which requires attention: the dressings should be renewed daily, if possible, for a time, seldom being delayed beyond two days, and great care is to be observed in avoiding wet and dirt. The parts are already in an engorged condition, or swollen from internal pressure of fluid, as well as enlarged from excess of nutrition; dryness is therefore needed to counteract the existing conditions. Some practitioners recommend the whole of the horny sole, and even portions of the wall, to be removed when canker has appeared beneath either. This is a painful operation, and should not be decided upon until the whole case has been gravely considered. After such removal it is usual to dress the raw surface with some caustic, as nitrate of silver, strong acids, or the mixture as recommended for the thrush (*ut supra*), dry tow being carefully packed over the whole, in order to ensure protection, and at the same time moderate pressure. In the mode of packing up the foot so as to ensure pressure, some tact is required, and when nicely accomplished, the benefit which is derived is so singular and wonderful, that many rely upon it before any other remedy.

When the fungus growths are large and extensive, they must be frequently cut down, and strong caustics afterwards applied. Of the latter, no particular reliance must be placed upon any one in particular. Nitric, hydrochloric, and sulphuric acids are all useful; likewise the perchloride of iron, butyr of antimony, &c.; but the secret of success rests in their frequently being changed, oft repeated, and perseveringly applied; yet much caution is needed in order to guard against wholesale sloughing, with eventual disease of the bones, as well as the production of irritative fever which may kill the sufferer.

As the disease really depends upon a peculiar state of the constitution, hope of cure must not be placed upon outward dressings alone. There are various organs which, if kept in healthy action, may be caused to eliminate from the system much that aggravates the original diseases. For this purpose, therefore, occasional purgatives and diuretics will be required, while tonics—particularly the sulphate of carbonate of iron—may be used in the interval by which the strength and tone of the system may

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be promoted and kept up. In the use of these several remedies no particular rule can be laid down. The person who undertakes the care and cure of canker in the foot of the horse, must be content to suffer many failures and much discomfiture. His reward will only result from patience, perseverance, and considerable tact in selecting the various agents at the most suitable times.

RAT TAILS IN HORSES AND CATTLE

Among the many forms of inflammation of the skin covering the legs of horses and cattle, that commonly known by the above title is probably not the least troublesome. "Rat tails" is a chronic affection, probably commencing, and being for some time confined entirely to the bends of the knees and hocks; but, owing to neglect in treatment, constant exposure to the action of cold, wet, together with irritating mud, &c., the whole of the legs partake of the inflammation, and eventually large cracks form across the legs upon each side, communicating with each other behind, the hair grows stiff and strong, standing erect from the legs, and presented in every conceivable direction. The legs become one mass of fissures, from which ooze a discharge of variable consistency, and by coagulation or hardening tends to create a fresh irritation.

As the disease proceeds, the hairs are matted together in large tufts, and these presenting the form of tails, have suggested the term now in general use. The edges likewise of the fissures enlarge and become hard, rough, and scaly; great irritation prevails, and the animal in its endeavours to allay it, rubs the limb against the gate or post; this not unfrequently giving rise to hæmorrhage and causing further aggravation. We have seen cattle turned upon cold wet limestone and clay pastures very liable to this disease, but horses are by far the greater sufferers, by reason of the more frequent extreme changes to which they are exposed. Wherever the disease appears, the affected animal suffers from great stiffness, often also from severe pain, and these combined tend to interfere with the general functions of the system so much as to produce what is known as sympathetic fever, when considerable skill in medical treatment is required, as well as exemplary domestic management.

In ordinary cases, the general plan of medical treatment is simple, but the owner must be prepared to exercise much patience, as this form of disease not uncommonly lasts a long time. The procedure in all instances rightly commences by acting moderately on the bowels by a dose of aperient or opening medicine, during the operation of which the animal should have

careful attention, particularly in winter time. Cattle suffering from the disease, when put under treatment as recommended, should be driven up to the straw yard, where they can have the comfort of a shed and plenty of straw; horses may be kept in the stable or a loose box, and the body should have some warm covering until the bowels have resumed their natural action.

Some days will be required to effect this, and at the end a course of medicine is to follow in regular and repeated doses daily. The medicines suitable are the carbonates of soda and potass, liquor potassæ, and the acetate of potash, all of which may be dissolved in the drinking water, or the three first may be mixed with the food. The liquor potassæ, however, requires first diluting in $\frac{1}{2}$ pint or 1 pint of water, when meal or bran may be used to absorb the whole and enable the attendant to make a more perfect mixture with the general food. Of these remedies the following dose may be given:—Carbonate of soda or potash, 1 ounce, morning and night; liquor potassæ, $\frac{1}{2}$ a fluid drachm, also morning and night; acetate of potash, 1 ounce at the same hours.

As a local or outward application, the best that can be used at first is a dilute solution of liquor potassæ, consisting of about 1 drachm to a pint of water, with which 1 ounce of glycerine and 1 ounce of laudanum have been added. When the pain and stiffness are severe, poultices may be called for in order to correct the character of the discharge, and reduce the attendant fever and inflammation, which will require at least four or five days, at the end of which the alkaline lotion before recommended may be used several times daily. After such treatment it sometimes happens that the healing powers are more active and possess a better tone; when after the discharge is reduced, the alum and mixture of myrrh lotion will answer very well, providing the kidneys are kept in order by means of the alkaline remedies already described. It must be always understood that when such a lotion is prescribed, the internal organs must also be brought under control, or serious consequences may result from too rapid drying up of the discharge.



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SIMPLE APPLIANCES IN DISEASES OF LIVE STOCK.

SIMPLE APPLIANCES IN DISEASES OF LIVE STOCK.

IN this and succeeding articles we purpose to take up the consideration of the various simple appliances, surgical, domestic, &c., which are so frequently required among live stock. The relative value of these are not uncommonly under-rated, a result, we fear, that has arisen from a want of greater acquaintance with the mode of action, objects of use, and effects to be desired; hence we find either too precipitate withdrawal or an abandonment of them, on one hand, while, from the same primary causes, on the other, a decided abuse follows. We proceed to notice in the first place

POULTICES.

These are valuable means of promoting the formation of pus—matter—either to be discharged directly from the surface of a wound, or from within a cavity located in the soft parts (muscles, &c.), generally known as abscess. In many parts of the country much prejudice exists in favour of certain substances, or ingredients, besides which nothing else is supposed to possess any qualification whatever for use as a poultice; for instance, one pins his faith to linseed meal, another to bran, a third to boiled turnips, and besides many other things, the excrements of animals and human beings are actually made use of.

The essential value of an ingredient for use as a poultice consists in its property of *maintaining heat and moisture*. That which will hold these the longest is therefore to be chosen, but we exclude from our category, *volens volens*, all kinds of excrement, as being not only inferior in the foregoing properties, but for stronger reasons—their filthy odour, and tendency to produce long-standing ulcers or sores, as well as positive blood-poisoning, ending in death.

Poultices are always applied in a heated condition. Great care is required in this particular, or serious consequences may take place. The proper temperature is from 112 deg. to 118 deg. Fahrenheit, and, in the absence of a thermometer, an ordinary test is the human hand, which, on being plunged into the substance, will comfortably bear the above degree of heat. The rough, hard hand of a labourer should not be chosen, as we have repeatedly witnessed such will bear a surprising amount of heat; one who is not in the habit of doing rough work will best estimate the

proper degree of temperature required, and much inconvenience as well as unnecessary pain be avoided.

In consequence of the required maintenance of temperature, those articles which exhibit a tendency to agglutinate, or stick close together, are useful in that particular, but they are objectionable, as in process of drying they form hard substances, and stick so closely to the wound and surrounding parts, that much harm is done thereby, especially in removal. Flour and linseed meal are of this class. To obviate this tendency, the substances may be mixed in various proportions; but what answers much better is to add to the heated mass a lump of hog's lard, which, after melting, should be thoroughly incorporated with it. Bran is generally used, as it is cheap, but, in point of efficacy, a mixture of bran and linseed meal is better.

Poultices should be applied *closely* to the affected parts, and, in order to secure this, an additional covering is required. The great object in all cases is to protect the spot from the colder surrounding temperature, and hasten the formation of pus; but if the poultice does not fit closely, the result is admission of cold air, a rapid evaporation from the moist surface, and a stoppage of the process we desire to promote. This result is a common cause of imperfect cures in such cases as grease &c., in the hind legs, and strangles, or formation of abscess in the space between the under jaws, among horses, foals, &c., in cattle. In each the weight of the mass is sufficient in the discomfort and fidgety state of the sufferer, to cause it to slip away from the parts and produce awkward states. The weight, therefore, of a poultice is a thing to be taken into account, for the lighter it can be made, the closer it may be made to fit. When the legs are the parts to be treated, the most useful plan is to use either a large strong, footless, worsted stocking, or make a strong canvas casing of due length, and somewhat greater cylindrical capacity than the leg itself. This is first put over the foot as carefully as possible, and when drawn into position, the bottom is secured, either round the hoof or pastern joint, as circumstances require, by means of a leather strap and buckle. (If the pastern be selected, the strap must not be drawn so tight as to interfere with the circulation.) The ingredients of the poultice, being already mixed in a pail or other suitable vessel, are now to be packed within the canvas case, so

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much being used as may either cover the leg all round, or largely over the particular part, and the top of the case being drawn towards the leg, a strap secures that also, and over the whole a long bandage is carefully bound.

This process cannot be carried out with other parts so well as the legs; the jaws, for instance, being a very awkward place to which we may secure anything of the kind properly. In fact, we have seen much harm result from their use, and of necessity were compelled to discontinue them. In some of the forms of strangles, great weakness accompanies the disease, and the weight of a poultice is a serious inconvenience. It is as much as the creature can do to hold his head without a poultice, and the addition of weight proves a great burden. In such cases many practitioners make use of a hood for the head, which, being placed in position, is packed beneath the jaws with several thicknesses of soft flannel, a bag filled with cotton wadding, or a thick sheet of spongio-piline, all of which are previously heated and applied dry. By these means the weight and other objections of an ordinary poultice are generally avoided, and good results are obtained. With the use of spongio-piline, capital results take place, if it be applied after immersion in hot water. Two pieces of proper size should be employed, having greater superficial extent than the parts to be treated; one is first applied and kept in place the allotted time, and the second is to be applied direct from the hot water the moment the first is removed. In this way alternate pieces are applied, and they prove soothing and curative, while they may be caused to lie close to the skin, and are of no appreciable weight, the waterproof and non-porous outer surface admirably preventing any evaporation and sudden cooling, which so often mars the efficacy of a poultice and thus delays cure.

In the renewal of poultices, also, there is much that should be avoided. They should never be allowed to remain on too long, and thus become displaced, hard, dry, or cold. As the great properties, heat and moisture, are gradually being dissipated, a renewal poultice should be prepared, nothing being left but the pouring on of the hot water and subsequent mixing to be done. Boiling water should, as a rule, be used, the whole being stirred with a stick, &c., and the mixture frequently tested, as before explained, until the heat is sufficiently reduced. At this stage the old poultice is to be removed carefully and quickly, and the second put in its place, avoiding exposure of the diseased surfaces as much as possible, for, being moist and heated by the poultice, the skin is now doubly sen-

sitive to the effects of outward conditions, from which dangerous reaction may speedily follow.

It may sometimes happen that such materials as bran or linseed meal may not always be at hand when a poultice is required immediately, or considerable delay may be occasioned by seeking them. Such an event is by no means uncommon in the experience of some veterinarians. Called in a hurry to some lonesome and small farm, the owner has not thought of them, and if they are to be sent for, hours may be wasted. Besides, a great quantity of the particular substance may be wanted, and in the end prove very expensive; again, it may not be essential that such costly articles as linseed meal, or even bran should be used, and therefore we must endeavour to adopt always such things as may be not only available, but also effective, and costing the least, for in each case of death these, trifling though they appear at first, help to make the loss still greater.

When the feet are diseased, poultices are not uncommonly used for a long time, and being large, much of the usual substance, is required, it may be amounting to several bushels; and we have found common sawdust, no matter of what kind, as good as anything. The feet are first placed in a suitable bag, and the sawdust previously saturated with hot water, is packed beneath and all round, a strap securing the whole round the pastern joint.

It is sometimes required to continue for a long period the application of cold by means of a mass in the same way as heat is conveyed by a poultice. Some practitioners prefer this plan to all others for the feet of horses under fever—founder or laminitis; nothing, therefore, can be better or cheaper than sawdust, and it is free from several objections which apply to bran, linseed meal, boiled roots, &c. It does not dry hard, it does not become soon sour, and its cheapness admits of its being used largely. Sawdust is objected to as a poultice for wounds, because it would greatly irritate them; but this may be overcome by first covering the wound by one or two layers of thin calico, &c., or applying the poultice in a bag on the outside. Pine sawdust often proves very useful in this way for drawing wounds, on account of the resin it contains, thus acting as a medicated poultice, of which more hereafter. In cases of emergency we have used the chaff, or flyers of wheat, and sometimes hay and straw cut by the chaff machine, each of which may be caused to accomplish all that is desired, viz., the application of heat or cold, and moisture, by the exercise only of care and diligence.

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remedies which are frequently required, viz.,

MEDICATED POULTICES

or poultices having some medicinal substance incorporated with them, for the purpose of producing some special effect, in addition to those effected by poultices of the common kind. For instance, when the feet have been injured, and dirt or other foreign substances have been allowed to enter; or when wounds are red, foul, and angry, or cold and producing no proper discharge, it may be necessary to promote the formation of pus somewhat more rapidly, and thus liberate the parts both from the irritation of foreign substances and the surrounding congestion, &c. In such cases a medicated poultice is called for, and it merely consists of one of the ordinary kind, having mixed with it some spirits of turpentine, common turpentine, or powdered resin, the hot water being sufficient to melt the latter when poured upon the whole in a boiling condition. When resin is used, some lard should also be added, in order to avoid the tendency to stick and become hard. The quantity of turpentine or resin must not be too large, or awkward results follow, a tablespoonful of the spirits, or a piece of common or Venice turpentine of the size of a walnut, being ample for a large poultice filling half a small pail.

When it is intended to apply a poultice to a part in which violent pain is present, laudanum and belladonna, with various other substances are used, but we cannot give precise particulars about these, as they must only be compounded by, and under the supervision of a medical man. It will be much safer for those not acquainted with medicine to employ poppy heads, bruised and mixed with bran, &c., as most suitable. There is a danger of some medicines being absorbed, and doing great harm, belladonna being one in reference to which we cannot be too careful.

Besides employing poultices in order to draw the parts, it may be also required to cleanse them from foul, bad smelling, irritating, and even contagious discharges. The feet of cattle affected with foul, the legs of horses affected with grease, &c., are often very offensive, and need much patience in order to overcome the noisome odour arising from them. It is usual to apply some substance which will destroy this odour, and at the same time, set up healthy action. One of the most common forms of such cleansing poultice is composed of powdered charcoal, kept warm and moist by warm water; but as the action of these appliances really depends most upon some ingredient, which is put into it as a vehicle, as bran, linseed meal, sawdust, &c., it is not essential that a dis-

infectant application consist entirely and solely of charcoal powder. We, therefore, simply mix with the article preferred, such agents as carbolic, or cresylic acid, bleaching powder, or chloride of lime, solution of chloride of zinc, chloralum, &c., the main thing to be remembered being, that such poultices should be frequently renewed, and always destroyed as soon as they are done with. In some instances ordinary lime is used with some other substance, as bran, sawdust, &c., but a more useful agent, which we would recommend in preference, is M'Dougall's disinfecting powder, mixed in the proportion of 1 lb. to 4 lb. of the usual article.

In the use of various leaves and plants as poultices; there is nothing to recommend them further than being useful as vehicles of heat and moisture, and in this particular are not equal to the articles already enumerated.

FOMENTATIONS.

It is not an unfrequent occurrence to hear horsemen and others speak of having fomented a certain part or limb with cold water, and another will use the same expression in reference to hot water. Such is decidedly wrong, although it may be, and we believe is, generally accepted and understood. To foment a part is to produce excitement in it—to increase or quicken the circulation of blood, and thus relieve those parts suffering from congestion or inflammation, or, after such a stage as inflammation, to promote the formation of pus, and ensure relief by its discharge by abscess.

The most simple remedy is heat, and we have already seen that one method of applying it is by means of certain substances forming what is known as simple, medicated, or disinfectant poultices. Another kind of remedy very much in effective use is hot water, and we term its application "a fomentation." We do not need to qualify the term by the degrees hot or cold; a fomentation is always hot, for hot water excites and produces the action we want, but cold water depresses, producing an effect the very reverse of heat, and is, therefore, not a fomentation. Whenever we write of fomentations, our readers will, we trust, understand that we refer to hot water only, unless otherwise specified, and when cold water is used, a totally distinctive term will be made use of, by which mistake cannot possibly arise.

Fomentations, like poultices, are both simple and medicated. We notice first.

Simple Fomentations.—Hot water, varying from 110 deg. to 118 deg. Fah., is the simplest and most accessible fluid for a simple fomentation, and as the temperature is of the greatest importance, a ther-

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mometer should, if possible, be employed to ensure the precaution of not going beyond the degree named. Where numbers of animals are kept and hot water is much called for, a thermometer is a useful instrument for various purposes, and as the cost is now so trivial, it is easy to obtain one equally suitable for testing either the temperature of air or fluids, so that no one need make the matter a subject of much difficulty.

The water should not be too hot, because it may produce serious injury, and it should not be too cold, as all the time and trouble may be thrown away, with no good results; but when proper attention is observed, we may assert without fear of contradiction, that no class of simple remedies will bear comparison with fomentations for their rapid and powerful effects; and conversely, when hastily, improperly, and defectively applied, none prove so very injurious. In order to understand these propositions, we must make use of a little repetition.

Hot and cold applications are equally opposed to each other. The first opens, relaxes, enlarges, and softens the parts to which they are applied, but cold water contracts, constricts, makes smaller and harder; therefore, when we use hot applications, we must be careful that the proper heat is maintained, not only during the use of the remedy, but also afterwards, for the parts are then very sensitive, and, being moist, any cooling by exposure to air brings on the very state we wish to avoid, viz., a *backening*, so called, of the inflammation. To excite first and immediately depress is very injurious, and delays the cure and progress towards health very much indeed.

Foot fomentations, to be of use, must be applied long and continuously. We often hear grooms and others say, "I fomented for twenty minutes," and we seldom omit to add, "then you have probably done more harm than good." It is impossible in so short a space of time to impart to the substance of a limb, or mass of muscle, sufficient heat to prove of any ultimate service; the parts being but just wetted, are often left quite unprotected, by which serious harm follows. Fomentations should be persisted in for hours, and every arrangement and precaution made and taken before the application is begun. The efficacy of hot water may be usefully illustrated by the following case. Some time ago a valuable horse had become fast in the collar chain which secured him to the manger, and he, struggling, fell in an awkward position. Shortly afterwards, by his effort to free himself, he hooked one of the hind shoes into the throat strap of the head

collar, and he was thus tighter than ever. This took place in the night, and the noise he made failed for several hours to call any one to the spot, but when he was found, he was growing very weak, and partly from strangulation and heavy bruises, his head and neck were as large as two. Besides, the breathing was very much impeded, and it was at first a question whether the windpipe should be opened, and from the same cause, it was absolutely impossible to expect him to swallow medicine. Our only course was to rely upon incessant fomentations, which were kept up for upwards of five hours, at the end of which time the swelling had considerably abated, medicine had been swallowed, and the patient took a small feed of oats. The plan of procedure was this:—A large copper being at hand it was filled and the fire lighted, in the meantime hot water was supplied from a distance. The horse was turned round in the stall and the head covered with two thicknesses of woollen cloth, and held over a large pail standing on a tub. Hot water was being constantly brought by one person who poured it in to make up the required heat as shewn by a thermometer, and another was occupied in pouring the water from a large jug over the top of the head on the woollen cloth. By this means continuous heat was applied and no evaporation took place, which resulted, as we have already said, in the greatest good, after which a dry hood was put over the head and neck, the parts being previously rubbed briskly with soft dry towels.

For the legs we find a proper tub, known as a leg tub, of exceedingly great value. In this the limb may be immersed for hours with ease, and to make it more effective, the hot water should be passed to the bottom by means of a large funnel and pipe, or the cold will settle at the bottom. The ordinary plan is to simply stir it frequently as hot water is added. In the absence of a leg tub, woollen bandages may be bound over the limb, and hot water poured on the top will maintain a proper heat. Pieces of old horse rug, woollen cloth, several towels, &c. may be used in emergencies, and a most effective action may be further introduced by covering these with a piece of oiled silk or gutta-percha sheeting. Spongio-piline is the article which at once fulfils all these offices. The soft side being placed towards the affected part, the outer as waterproof prevents any passing away of heat.

It should always be understood that when fomentations have been applied, the parts require to be dried as soon as possible by suitable friction and soft dry cloths, and a thick warm covering applied at once; for the legs, bandages answer quite well,

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and for the body two or three ordinary rugs. To foment part and leave it to dry afterwards is a bad proceeding, and does great harm in the majority of cases.

Medicated Fomentations.—The value of these have been greatly over-done as well as over-rated. It is also very likely that they came into use in consequence of a desire to expedite the action of hot water, more especially as the practice of applying it was confined to short periods, when, as we have already shewn, the minimum effect only would be obtained if any good at all came of it. Fertile imagination in this, as in all instances where it has free course and exercise, was instant in suggestions, and the result has been a whole and almost endless catalogue of remedies, which are rewarded with excellent characters for doing this, that, and the other; but whether owing to our dulness of comprehension, ignorance, something else, or the whole combined, we have to confess that up to the present time we do not appear to have recognized so many valuable properties. Our faith has not been shaken in the *invaluable* effects of hot water, *properly* and *continuously* applied, therefore we have preferred to adopt it, always feeling certain of success and ultimately obtaining it, which is not inevitable by the use of so many compound remedies.

It may be contended that the addition of certain medical agents are called for in some instances for the reduction of severe pain, as well as swelling; yet we do not see that to be necessary, inasmuch as pain is the result of swelling; for, as we reduce the last, the first subsides as a most inevitable result, and for this nothing can be more effective than simple hot water, under proper regulations—so far, of course, as regards outward applications only. When, however, we desire to gain time, to act powerfully on the system, and thus remove some serious obstruction, we take advantage of *internal* remedies as well. Thus, when a limb is extensively swollen, or, as in the case cited in the preceding article, we may desire to give some drug which we know will assist, by influencing one or more of the internal organs, as the bowels or kidneys; but when the power of swallowing is denied, no alternative is left but to rely entirely upon fomentation; and in selecting from our Note Book of cases, we could not give a more complete instance of the great value of a simple remedy, the secret of which lay only in the continuous heat and application. The use of simple hot water may be carried on for hours, and without enormous trouble or expense; but if we are inclined to decoctions of herbs, and hot applications of the juices of rare plants and those only of local growth,

which fanciful minds and quackery suggest, we may fritter away not only valuable time, but also money, and, it may be also, the life of a valuable animal.

COLD APPLICATIONS.

The application of cold to a diseased part is intended to effect totally opposite results—those of depressing the circulation, limiting the flow of blood in the part, and it may be also to brace up or strengthen the tissues. While hot water is most suitable for the soft parts, cold is commonly taken advantage of for the legs, &c., and those parts where sinews or ligaments are present, to the exclusion almost of muscle. Some practitioners prefer cold water to the feet under inflammation, likewise to the legs when tendons are sprained and lacerated, while others always use hot, and, we think, with greater show of reason.

There is an opinion largely abroad that cold water bandages are necessary to hunters and carriage horses, &c., in order to keep down inflammation, and prevent the consequences of work, such as thickening, puffiness, knuckling over, &c. Some prefer linen, others woollen material and these soaked in cold water are put on and allowed, generally, to become dry, the rule, as it is expressed, stating that these should be frequently wetted; yet notwithstanding this departure from the plain directions, puffy legs diminish, and tender spots become less sore; and how is this? Simply because the benefit has not arisen from the cold, but from the *reaction*. As soon as the cold is applied, the first effect is to constrict the vessels, but the second is to promote warmth and increase the circulation—which is the very essential old and battered legs require. They have lost their tone by hard work, the circulation is enfeebled, and the stimulus of cold—succeeded by reflex action on the blood-vessels—is the indirect means of restoring the balance of function which has been lost. Such is the true principle of hydropathy, and in this form it has existed, been known and practised by every stableman down from his majesty the stud-groom, or coachman, to the least among the strappers. From sweating the legs of horses in the stable, the principle has been taken to higher quarters; and, as applied to the human subject, it is now dignified with the name of a science.

When the application of cold is really required, no good can come of using it by fits and starts. To be of essential service, we must avoid the reaction which we have already alluded to. It is a common plan to immerse a limb in cold water, frequently renewed for some time before an operation is to be performed with the knife, the object being to produce a depression of temper-

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ature throughout the very substance of bone and tendon, &c., and thus materially limit the flow of blood. In such a case, the cold must be persistently kept up, or we fail in our purpose. The plan simply consists of causing the animal to stand with the limb in a leg-tub, an assistant being required to add from time to time a pail of fresh-drawn cold water.

In order to intensify the action of cold water, particularly in warm weather, various saline substances are called into requisition—the most common being nitre, saltpetre, so called sal-ammoniac, &c. These produce a low state of temperature by their solution in water; therefore, they should only be used at the moment they are mixed. For, after they are dissolved, the temperature of the fluid rapidly rises to that of the surrounding atmosphere, and no other good than that of simple cold water can be obtained.

CLYSTERS OR ENEMAS.

Clysters, injections, lavements, or enemas, as they are variously termed, form exceedingly valuable agents in the treatment of disease among the lower animals. There are several kinds, which we proceed to notice in the usual order of application.

Fluid Enemas.—The most common form consists of simply tepid water, or of water in which common salt has been dissolved, or hard or soft soap rubbed down to form a tolerably strong solution. The common object of injections is to promote the action of the bowels during inactivity or costiveness; and, likewise, in cases of overloaded stomachs. For this purpose, the water should not be too hot, as the object may be greatly frustrated; but in order to effect a more speedy solution of salt or soap, it may be used at a boiling heat by being poured upon either when placed at the bottom of a pail; and after agitation, or standing some minutes, the required temperature—not more than 100 deg. Fahr.—may be obtained by adding cold water.

It scarcely needs to be explained that injections are passed into the rectum or bowels by the anus or fundament—an assistant usually holding aside the tail with one hand while he steadies the instrument with the other; a second person being employed in supplying the water from time to time.

Various instruments have been recommended, most of which still continue in use in different districts. The oldest consists of a large bladder armed with a hollow wooden nozzle or pipe, the outside diameter of which is not more than 1 inch, and the whole length about 6 or 7 inches. A piece of elder wood, after the pithy part has been removed, and the free end properly rounded off, forms the usual primitive

country appliance. The opposite end is grooved or notched by a knife; so that, in tying on the bladder, greater security is maintained and accidents avoided. To fill the apparatus, the bladder is immersed in the fluid, pipe upwards, and a small funnel inserted through which the water is poured. When sufficiently charged, the whole is carefully lifted out, and the wooden pipe being gently inserted in the rectum and held there by one assistant, another, holding the bladder in both hands, exerts steady pressure all round, by which process the contents are speedily discharged into the bowels.

Another instrument consists of an ordinary brass, tin, or Britannia metal syringe, capable of holding from 1 to 3 or 4 pints. The objections to this are, it is inconvenient for being carried about, but this does not apply in those cases where the instrument is for home use. There is also liability to produce irritation of the rectum by frequent use during protracted disease, owing to the necessity of removal after discharge. And unless great care is exercised, the barrel is subject to bruises which derange the packing of the plunger, and soon render the instrument worthless. Reid's (expired) patent syringe is a very useful but costly instrument. A long tube of caoutchouc, or covered wire &c., mounted with a suitable wooden nozzle, communicates with a brass barrel and plunger. The nozzle is inserted in the rectum and held there, while a person works the syringe, as it stands some distance away, in the pail containing the water. The effect is to produce a continuous stream of water without removing the apparatus from its position, while the operator may escape the annoyance so common with other instruments, which is the forcible discharge of the contents of the bowels, not of water merely, but, it may be, of bad-smelling fæcal matter also. This instrument is now fitted for compound uses, as a probang or choke rope, for washing out the bladder and gaseous enemas, but it is more adapted for the service of the veterinary practitioner than of the stable where only a few horses or cattle are kept.

The most simple and yet efficacious instrument is the enema funnel, which may be obtained at a small cost, and unlike the syringe, is not rendered useless by blows or falls, &c. The funnel may be almost any size from the capacity of $\frac{1}{2}$ pint to 1 quart, but we do not see any reason why it may hold any more than the last-named quantity. At the bottom of the funnel the pipe is turned at right angles, and continued to the extent of about 12 inches, tapered, and rounded at the extremity by laying on of a quantity of solder. To use

the funnel, tie in the rectum water is poured with a gurgling out any difficulty.

The quantity for horses and at a time, and should be abundant with order. If the bowels, active, two or three of the course of the d is overloaded, exists, it may every half hour and temperature nearly over.

Gaseous Enemas.—more decided effect can give are spasm, the result &c. Notwithstanding have brought an extreme pain of creature rolls at danger, and that spasm may be a gaseous enema, as follows:—

The patent syringe barrel, which can be obtained at a tobacco and a hole screwed on at the top is then worked which has the effect the heated tobacco and as soon as it evolved, the nozzle, the action of the rectum, the action, minutes or more, intervals as may be of a tobacco smoke soothing or sedative fibres of the bowels are firmly contracted, and thus pain removed. Horses give almost immediate relief, for when on ground when rolling will stand quite still to be injected during time.

In some extreme cases of dried opium are placed, the tobacco, which, give off powerful fumes, a dietic tendency. As in all ordinary cases, it rests solely on the use

the funnel, the pipe is inserted gently within the rectum, funnel upwards, and as the water is poured in at the top, it descends with a gurgling noise into the bowels without any difficulty.

The quantity of fluid usually employed for horses and cattle is about 2 or 3 quarts at a time, and as we have already said, should be about 100 deg. Fahr. The frequency with which injections should be used, will depend very much upon the disorder. If the object be simply to excite the bowels, and assist a moderate purgative, two or three may be given in the course of the day; but when the stomach is overloaded, or obstinate constipation exists, it may be needful to repeat them every half hour until the pulse, respiration, and temperature decide that the danger is nearly over.

Gaseous Enemas.—There are cases where more decided effects than fluid injections can give are required, such as violent spasm, the result of overloaded bowels, &c. Notwithstanding the fluid injections have brought away much faecal matter, extreme pain continues, and the suffering creature rolls about greatly to his own danger, and that of the attendants. Such spasm may be more or less subdued by a gaseous enema, and the procedure is as follows:—

The patent syringe has fitted to it a separate barrel, which screws on to the main barrel at right angles. This is filled with tobacco and a hot cinder, and the tube is screwed on at the opposite end. The piston is then worked freely up and down, which has the effect of driving air through the heated tobacco, along the flexible tube, and as soon as a full stream of smoke is evolved, the nozzle may be inserted in the rectum, the action being kept up for ten minutes or more, and renewed at frequent intervals as may be required. The effect of a tobacco smoke injection is that of a soothing or sedative kind, the muscular fibres of the bowels, which, during spasm, are firmly contracted, being induced to relax, and thus pain is reduced or altogether removed. Horses have been known to derive almost immediate benefits from such means, for when caused to rise from the ground when rolling in a fit of spasm, they will stand quite still, and suffer the smoke to be injected during almost any length of time.

In some extreme cases, small portions of dried opium are placed among the fibres of the tobacco, which, during the burning, give off powerful fumes of an anti-spasmodic tendency. As a rule, however, and in all ordinary cases, it is best for amateurs to rest solely on the use of tobacco alone.

SETONS.

Like a good many other remedies for the cure of disease which have fallen into disuse or disrepute, setons are now not so much in request as formerly. At one time, and even within recent years, it was quite as common for a seton to be inserted for the cure of minor complaints, as in earlier times bleeding was the universal and all-important means of dissipating all the evils flesh is heir to, as well as of those which existed only in the fleshy imagination of hypochondriacs, and old maids who were affected with doctors on the brain. If a dog were brought suffering from sore throat, the treatment was, "Insert a seton beneath the jaws, extending to the chest." A horse was served in the same manner; and if the cow proved guilty of such a sinful malady, which was rarely observed, she had one a little longer and ever so much thicker, because she is such an insensible being—so it was said. When horses suffered from an attack of indigestion, which caused a hind leg to well, the most orthodox remedy was a seton; if the feet suffered from inflammation, a seton was put through each frog. In chest affections, such as inflammation of the lungs, one of extra length was recommended; "Indeed," said one authority, "it can scarcely be too long."

We well remember, when this axiom was uttered, the author did not reckon upon his auditory, for among the number was an aspiring groom, who, having been some years in the service of an officer in the army, had therefore seen large experience, and was already, as he thought, in the shoes of Esculapius himself. This worthy had witnessed the extended adoption of setons for many ailments, and having a roving commission among small horse and cow proprietors of the adjoining town, practised among their animals for his own immediate benefit, at once began to torture them for everything. It was marvellous how many yards of tape that fellow got through in a few weeks. He did his work well, too. The last case he was permitted to try his hand upon died before it could be decided whether his seton had any beneficial effect, with which also died out, and justly, his reputation. The creature was suffering from contagious lung complaint, notwithstanding which she was cast upon the ground and, by means of the usual instrument, a seton was inserted, commencing at the jaws and passing down the front of the neck, over the chest, between the fore legs, terminated somewhere near the navel on the abdomen, certainly not less than 5 feet in length.

However absurd this illustration may represent the remedy, it is nevertheless a

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certainty that setons are very useful agents in the cure of disease; like everything else, they should be adopted with mature judgment. They are constructed as follows:—A suitable needle having a eye sufficiently broad to receive tape or round cotton cord, is passed beneath the skin for some distance, either over or contiguous to the parts diseased, an opening being usually made through the skin at the respective points of inlet and outlet. Sometimes a needle having a sharp broad point is made use of, which makes both these orifices; but usually they are first made by either a lancet, forceps, or an appropriate knife. Slight alteration is made in accordance with the nature of the parts. If the skin is loose and mobile over them, it may be taken up in a thick fold by the left hand, and the sharp needle passed through one thickness of the skin. Afterwards the skin is allowed to recede to its proper position, and the needle is gently pushed with a sidling motion along the surface of the muscles, &c., the left hand by pressure on the skin directing it along, as force is applied by the right. When it has been passed sufficiently far, the skin is again gathered into a fold and held tightly by the left hand, while by extra force the needle is caused to come outwards. The skin is then smoothed over, needle drawn through, and the tape secured.

In those parts where the skin is thick and tense, tightly bound down and unyielding, a somewhat different plan is adopted. The needle is furnished with a *blunt* point, and at the extremity is a small rounded knob, or eminence. An orifice is first made through the skin, usually by means of forceps not unlike scissors, the points of which are hooked. These, being caused to grasp the skin, are pressed together, they enter and divide it, leaving a gash about 1 inch long. A second is cut at the point of exit. Then the blunt needle is passed under the skin from one hole to the other, drawn out, and the tape secured.

There are two ways of securing the tape. One consists of bringing both ends together, and tying them in a common knot; the other is more preferable and less liable to accident, as there is no loop to catch, whereby it may be drawn out or tear the skin. It merely consists of tying a separate piece of wood to each end, and letting them hang free.

The next condition to be noticed is to take care that the seton is moved, or drawn backwards or forwards every day, the object being to prevent adhesion, or obstruction to the flow of pus, and to promote the discharge. The parts below the orifices should likewise be kept clean, and

free from accumulating discharges, as much irritation and even blemishes may result; but if the hair beneath, over which the discharge may flow be moistened with a little olive or rape oil, blemishes will be prevented.

The object of a seton is to produce *continued* irritation, and by the constant formation of pus, drain away morbid matters from the system; in ordinary estimation they are solely for the purpose of overcoming some already existing local inflammation; thus they are applied over the seat of spavin; beneath the jaws for chronic irritation of the throat and threatened roaring, &c.—and one of the most useful ends to which they are applied is for the prevention of black-leg in young cattle. For this purpose, one of 10 or 12 inches is inserted in the lower third of the neck and dewlap, and this, while it certainly reduces the over plethora of the system, at the same time produces a temporary inconvenience and limits the thriving properties of the animal.

It is a common plan to dress the tape or material used, a little resin or green ointment being usually selected, but practitioners will also use blistering ointment, and sometimes the tape is previously saturated with a preparation such as tincture of cantharides, &c. The objections to setons are, their slowness in action, therefore they are not suited to cases of high and active inflammation; and besides this they cause ugly blemishes. In the first instance, they must always give way to more powerful and immediate agents, and in all cases where they may do good, it may be wise not to observe the scar with too critical eye, for a good animal restored with a blemish may be worth a hundred, whose organs may be incomplete or unsound by reason of false treatment, and too great fear of contracting such marks.

ROWELS.

When farriers of the olden times desired to produce continued local irritation, and so divert the action of circulation from parts already in a state of unusual vascular excitement, they made use of rowels. In most respects these surgical means are similar to setons, but are neither so convenient nor so sightly.

In the formation or insertion of a rowel, no needle is required as for the seton, but a pair of scissors, known in surgical language as forceps, having sharp and hooked blades, are employed to divide the skin as it is held in a fold between the fingers. A slit of an inch or more is made, then the hook of the forceps, which forms the handle, is inserted, and by a tearing action the skin is forced from its connexions with the muscles, &c., beneath all round the open-

ing, for the persons affected but sometimes which will inflict wounds therefore for a cut surgical wound convenient and the cause of

Having been described, the foreign object and set up matter may be removed through the instrument of a piece of leather boot. In doing so should be a hole of about the size of the rowel in the centre, which consists of materials round leather, commonly passing outwards the whole of the length. This proceeding of creating more leather would powerful means saturated with turpentine liniment, besides to which ignorant attach any value

To insert the often required, or should not itself, or it will and useful plan as to form a handle through the end through the ing it beneath other end has all or rowel is flat in proper shape, and opening will cover skin, and thus act as it forms.

It cannot be doubted to be a very effective certain circumstances entertained the ground in consequence of forcibly tearing a savours of so much simplicity and save do not conceive in they are superior, which may be in part of the time, the animal, and greater curative power

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ing, for the space of 1 or 2 inches. Many persons accomplish this by the fingers only, but sometimes strong fibres are met with, which will resist much pressure, and even inflict wounds upon the operator. It is therefore safer to divide these by the knife, for a cut produced in forming such a surgical wound may prove not only inconvenient and troublesome, but painful, and the cause of anxiety.

Having separated the skin in the manner described, the next course is to insert some foreign object in order to prevent union, and set up so much irritation that pus or matter may be formed and discharged through the opening. The stereotyped instrument of the old farrier is a circular piece of leather, cut from the uppers of a boot. In diameter, it is recommended it should be about 2½ inches, and a circular hole of about 1 inch in diameter is placed in the centre. The next course is to arm the rowel by means of tow or soft twine, which consists of winding one of these materials round the circumference of the leather, commencing from the centre and passing outwards, and so on until the whole of the leather is completely covered. This proceeding has for its object the effect of creating more irritation than the simple leather would do, and when even yet more powerful means are required, the whole is saturated with blistering oil or ointment, turpentine liniment, savin or resin ointment, besides no end of other ingredients to which ignorance alone would resort or attach any value.

To insert the rowel some dexterity is often required, as the external opening is, or should not be, so large as the rowel itself, or it will fall out. The most simple and useful plan is to double the rowel, so as to form a half-moon shape, and pass one end through the incision in the skin, turning it beneath and onwards, until the other end has also entered, when the disc or rowel is flattened or brought to its proper shape, and let so that the central opening will correspond to the hole in the skin, and thus admit of the passage of pus as it forms.

It cannot be doubted that a rowel may be a very effective surgical remedy under certain circumstances, but we have always entertained the greatest repugnance to it in consequence of the necessary amount of forcibly tearing away of the skin, which savours of so much barbarity rather than simplicity and saving of pain. Besides, we do not conceive in any other respect that they are superior, or even equal to a seton, which may be inserted in one-twentieth part of the time, with far less pain to the animal, and in addition, possesses greater curative powers. There have been,

however, many instances in the course of our experience in which the proprietor will have his way; instead of taking advice, he will give it, unhesitatingly names all the remedies he insists on having administered, and having a lingering attachment for old-fashioned remedies, boldly demands that a rowel shall be inserted. Under such circumstances we have refrained from the usual cutting up of the upper leather, and having formed a moderately-sized ring of soft tow, and smeared it with some stimulating unguent, we have substituted it for the more clumsy and necessary disc or washer-like body usually recommended. In this way we avoid much of the barbarous ripping up of the connexions of the skin with the subjacent textures, and in the end produce all the irritation that can be expected from the remedy. This method has also other advantages. The soft, yielding ring of tow is easily removed and readily renewed, while the leather washer is a bulky, awkward affair, removed only by difficulty and causing pain; and when it requires cleaning, men are not always willing to undertake it. The tow is merely drawn out by means of forceps and thrown away, another ring being ready for insertion when the first is withdrawn.

It remains only to add, that whenever rowels are used, the parts below require to be kept free of the discharge, or great irritation and blemish occurs. As already recommended, it is a good plan to smear the skin below the wound with oil or lard, which has the effect of guarding it from the action of the fluids discharged from the wound.

The purposes for which rowels are employed are much the same for which setons are advised, but, it must be observed that they can be of service only in chronic and sub-acute forms of disease, their action being too slow and passive to be of any service in acute and active stages of any malady. It was a common practice at one time to rowel for everything almost. When horses were periodically subject to a swollen hind leg as a result of indigestion and neglected stable treatment, in the place of sensible investigation as to causes, and institution of proper routine, a rowel was inserted on the inside of the thigh, and with this source of irritation, the poor creature was doomed to work days and months even. When others suffered from constant cough, dependent upon a heated and impure stable atmosphere, instead of giving fresh air, a rowel was recommended to be inserted between the jaw. Such a method of curing continued until the animal died from complicated disease. Later, the seton, took the place of the rowel, and it has been

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caused to perpetrate as much mischief and suffering.

Not contented with the usual irritation derived from tape as a seton, or leather as a rowel, many persons have substituted the fibrous root of poisonous plants, black hellebore being one of the most common, by which they have hoped to irritate and cure powerfully and rapidly. As a cure for blackleg, and also as a means of prevention, hundreds of young cattle have thus been tormented, and not a few have died from the effects of absorption of the poisonous principles of the root. A few years ago, a large farmer in Northamptonshire lost the greater portion of his young stock by these means, and we could name many other cases of a similar character which have come under our personal observation.

To conclude, we would urge our readers to use only simple remedies. If a seton or rowel is recommended, let simple tape or tow and blistering ointment only be used, and there will be no fear of awkward consequences.

BANDAGES.

The common value of bandages, we verily believe, is not appreciated so much as they deserve, and, therefore, as simple means of good they are either entirely set aside or used at wrong times. We will notice some of their most common and valuable properties.

Bandages are used as dry applications and sometimes as wet ones. In the first instance, their offices are for maintaining poultices or various dressing in proper position, and sometimes for the purpose of producing direct pressure upon a particular part. In such cases their value depends most upon the strength or toughness and unyielding nature of the material of which they are made than upon anything else. Weak and yielding material affords no support, and under the motions of a fidgetty animal proves worse than useless. For the purpose named, nothing answers better than long strips, about 3 or 4 inches wide, torn from a piece of strong "wrapping"—a material easily obtained from drapers, whose goods are usually received packed in it. From this circumstance it is also known as "pack or packing-sheet."

An ordinary bandage is about 4 yards long, but for cart horses, and when the limb is made somewhat bulky by dressings, &c., the length should not be less than 6 yards. *The edges must not be bound*, as some persons in mistaken economy have done, for the result is the production of a hard edge, which galls the limb, sometimes frightfully. One end requires to be mounted, and it is to be done as fol-

lows:—First fold down the corners flat towards each other, leaving about $\frac{1}{2}$ or $\frac{2}{3}$ of an inch of the end. Stitch down these flaps, and upon them a piece of tape, doubled, the free ends, about 15 inches long, being left for tying when the bandage is put on.

No further work is required, the bandage is ready for use, and to be applied as we now direct. Fold the tapes inwards and across the end of the bandage, and commence to roll it up from that end, which process will require a little practice before it can be done neatly. We will now suppose the leg has received the intended dressings, &c., and so we begin at the lowest part, first laying flat the free end of the bandage on the bare leg, or upon not more than a single layer of covering that may be used. The roll must be outwards, so that in passing it round the leg it is being constantly rolled over the surface and unwound at the same time. By this method the turn is made, passing over the free end and thus securing it; the next is carried somewhat higher, the next higher still, and so on, until the whole surface is covered, and it may be necessary to return, forming another layer as the operation descends. At the completion the tapes are drawn out, one being passed round one way, and the other in the opposite, and, meeting on the outside, they are tied in the ordinary manner.

When direct local pressure is desired, as, for instance, over the wound in which an artery or vein has been opened, and a large flow of blood is to be stopped, the same kind of material is the most useful, providing it is a part to which a bandage can be applied; and in order to give full effect to the process, we first pass the bandage round three or four times, layer above layer, and thus obtain a hold that will not give way by slipping. When we reach the part where pressure is particularly desired, a pad of tow, rag, cotton, wool, &c., is laid over it; and, passing the bandage several times in half-layers upwards, returning in like manner downwards, the requisite pressure may be obtained, or it may be increased by placing a piece of leather, wood, or sheet-lead over the pad itself.

Dry bandages are sometimes used to brace up the legs of aged and hard-worked animals. We do not see much use in them for that purpose, and therefore have never recommended them. They are, however, extremely valuable after the legs have been washed, particularly in cold weather, and having tested their efficacy, we advise their adoption rather than asking a groom to do what ninety-nine out of a hundred cannot do, viz., to rub the

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SIMPLE APPLIANCES IN DISEASES OF LIVE STOCK.

legs dry. After washing the legs, as much of the moisture should be removed as is possible by pressure and rubbing with a coarse towel, and before they are allowed to cool, thick flannel bandages should cover all the parts wetted, viz., as far as the knees and hocks, and above these no washing ought to be done.

Wet bandages have a corresponding use and value in the stable. Stale legs are sometimes very much improved by them, the swelling or gumminess disappearing, and the natural form and fineness becoming more prevalent.

There are two kinds of action to be derived from wet bandages, one a continual cooling, the other first cooling and subsequent reaction, or heating. When, therefore, it is necessary to produce a continual cooling action, the bandage should be composed of thin and coarse material, and cold water should be continually passed over it, thus producing a constant source of evaporation from the surface. But where we desire to reduce the puffiness of stale legs, we then set up a sweating process, and to do so best is to use a thick woollen bandage wrung out of cold water, which is to be retained even long after the leg has given evidence of being much warmer than before. Many grooms make use of these means, ignorantly believing they are adopting the cooling process, which is, however, precisely the reverse of this.

There is yet another kind of bandage to be noticed. It is known as the "many-tailed bandage." As there are many parts of the body which will not admit of an ordinary bandage being applied, the many-tailed one suits admirably. It is thus constructed: Two pieces of stout material of equal size are taken—perfect squares are best—and one side is cut up into slits or ribands, leaving about two inches of complete margin only. The same number of slits must be made in each, so as to produce the same number of bends or tails. In applying these glue must be used, the outer margin or border being glued on one side of the wound or affected part, the tails facing each other. The wound is dressed after the glue has set, and the tails so arranged as to correspond, are brought together and tied. By these means wounds in awkward parts may be closed without inserting sutures, or at least with only a few, and local pressure obtained with the most satisfactory results.

SUTURES.

Sutures are simply surgical means of uniting the lips or edges of a wound so that as the healing process is going on, the wound closes or grows less, and the break in the skin, etc., becomes obliterated. They

are not the only means by which wounds are closed, but are nevertheless most commonly made use of, and to the various kinds which the veterinarian employs we shall now direct our attention.

The most simple and common is the twisted suture—a term, however, which conveys but little meaning of its exact nature. The materials used are pins, and tow or soft twine; the former are passed through the skin, and the latter twisted round the first. The pins should be strong, of requisite length, and have sharp points, or they will neither stand the pressure or enter the skin; indeed, a round point is the very worst, and it has been found that to flatten or beat it square or triangular answers every purpose very well. The length of pins required varies from $\frac{1}{2}$ of an inch to 3 or 4 inches. When wounds are inflicted about the eyelids, and in parts where the skin is thin and loose, small pins will do; but when the skin is thick, and not easily moved over the subjacent parts, as on the legs, haunches, etc., then large and even thick pins, such as are called carpet pins, are required.

When a wound is to be closed, the parts are first examined in order to see how the sides may be matched, and care is required that no dragging or puckering results, which may ensure a large cicatrix or swelling over the wound, besides delay in healing. When all this has been provided for, and foreign bodies removed, a pin is to be passed through the edge of the skin on one side, from without inwards, avoiding all other tissues. The skin on the opposite side is next brought up, and the pin point passing under it, is caused to come out about $\frac{1}{2}$ or $\frac{2}{3}$ of an inch from the raw edge. Thus two edges of the skin are included, but from tension and pressure, one will slip off from the point if the fingers are removed, therefore, the binder must be put on before any more of the wound is closed. This consists of soft twine, or tow that has been drawn out and twisted, and is passed several times beneath the pin from one side of the wound to the other, and across, so as to form the figure 8. When sufficient has been used, the ends are tied in a common knot; but, as a rule, and when soft twine is used, a single loop answers perfectly well. After the first, another suture is inserted, and so on at regular intervals, of say one inch or thereabouts, until the wound is closed; and it is well to observe that the lowest part should be left slightly open, that better escape for pus will be ensured, or an awkward abscess may result.

We have said the pins may present some difficulty in passing through the skin, and to overcome this, several plans are resorted

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to. One consists of using a triangular stiletto, or needle in a handle, with which a hole is first bored; another in squaring the point of the pin with a file or hammer, and so raising a number of cutting edges, which enables the operator to pass the pin with very little trouble indeed.

Besides the twisted suture, there are others in common use. The interrupted suture is nothing more than thread, silk or twine, passed from one side of the wound to the other by means of a triangular and curved needle, the skin being drawn together, and thread or twine tied in a firm knot. A number of such stitches or sutures are inserted at short intervals as may be required, and it is necessary to observe that they require to be somewhat closer than the twisted suture.

Another form of suture is called the continuous or uninterrupted, from the fact that the thread or twine employed is passed from side to side continuously until the whole of the wound has been included. The twine is next drawn tight, in order to close the lips fairly and evenly, and the ends are tied, sometimes by being brought together, or by passing beneath the first or next stitch.

The metallic suture, so called because metallic wire is used, consists of soft wire, drawn from an alloy of lead and tin, of several sizes. This is preferred by some practitioners, and used generally as the single or interrupted suture, being drawn through the skin by means of a needle, and the ends, after cutting off, are twisted round each other.

Various objections and disadvantages attach to these sutures: for instance, the thread or twine used for the interrupted and continuous sutures, acts as a great ir-

ritant, besides, the tension of the skin often causes the thread to cut its way out, and thus a wound, ragged and jagged, gaping far wider than before, is occasioned, and in the end an enlarged cicatrix, which looks very foul and awkward. This objection is almost overcome by the twisted and metallic sutures, and more especially when the mode of dressing is properly carried out. A great deal depends upon this, yet very grievous mistakes are made, where a very little trouble taken would obviate all.

We have yet another kind of suture to notice, the *quilled*. It is usually resorted to when the skin is inclined to stand upwards, and pressure is required to produce a more even union of the edges. The quills are nothing more than half round pieces of wood, corresponding in length to that of the wound itself. Two are required, one for each side, and the flat sides are laid upon the skin close to the edges of the wound, parallel with each other. Before, however, these are so arranged, several interrupted sutures are inserted, and notches are cut in the sticks or quills to correspond. The quills are then placed in position, and the sutures tied over them, which has the effect of bringing the quills close together, flat on the skin, so the edges are maintained in an even state, by which healing is promoted, and without the tendency to form a bulging cicatrix. This kind of suture is suitable for large wounds also, providing they are evenly cut, and the same may be said of each of the foregoing. When wounds are inflicted by tearing and bruising, such sutures are not always applicable; therefore our remarks bear reference most especially to those known as cut or incised wounds, such as are inflicted by some sharp instrument.



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HOME-RAISED TREES—AMATEUR NURSERIES.

HOME-RAISED TREES—AMATEUR NURSERIES.

THERE are many planters who cannot give the attention required for raising the young trees for new plantations, and these will always purchase of large nurseries. Others not only can spare the time and labour, but they become positively interested, and derive much pleasure from planting, cultivating, budding and grafting young trees, and the practice acquired in managing these small plantings, gives them some additional skill in selecting from large nurseries, and in managing orchards of bearing fruits. To such persons as these, a few pages of hints and practical directions may be acceptable.

SOIL FOR NURSERIES.—A good soil is more important for a nursery, whether small or large, than from any other purpose.

There is too much labour expended on a small space to waste it on poor land.

Ten thousand good trees may be raised on an acre of the right kind of ground, and the trees will be worth from one to two thousand dollars. But if the soil is wet or sterile, or otherwise unfit, there may not be a hundred good trees in the whole—ninety-nine hundredths may be poor, crooked or stunted.

It would therefore be better to pay a hundred dollars annually for the rent of the best ground, than to obtain poor land for nothing.

A rich, well-drained, medium loam is best for a general nursery. A light or sandy soil will raise peach and cherry trees, and often apples, but a stronger one is required for pears and plums. But even a clayey soil, if thoroughly drained, well-worked and properly enriched, will usually grow all these to advantage, and better than a light sand. The ground should be quite



Fig. 1. free from stones, as these would add greatly to the labour of cultivating and digging the trees. Nothing is better than an old pasture, if thoroughly ploughed and made clean and mellow the previous year. Or if the soil of the pasture is deep and rich, it may be turned over early in the spring and put in good order at one operation, by inverting the sod with a large double plough. A similar operation may be performed with a spade and hand labour if but a few trees are to be planted. If not rich enough without manuring, the

manure should be applied a year or two previously, and well worked by cultivation; or if it consists of good, thoroughly rotted compost, it may be applied the previous autumn, or even early in the spring before planting. Forty or fifty bushels of unleached wood ashes per acre, or two or three times as much leached will be likely to have an excellent effect. These may be spread and harrowed in, or mixed with the compost at the rate of a tenth or twentieth part of its bulk.

LAYING OUT.—The rows may be about four feet apart, and vacant strips twelve feet wide may be left at each end for the horse to turn upon in cultivating.

SEEDLINGS AND STOCKS.—For a small home nursery it will usually be most convenient to purchase

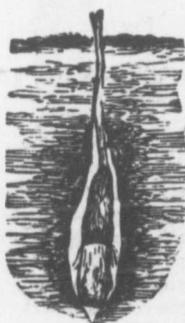


Fig. 2.

the one year seedlings of dealers; otherwise they may be raised in seed beds. In raising seedlings it should be borne in mind that the seeds should be sound and fresh, and from the best growing sorts for vigor. If they are dry or shrivelled, they will not grow. Apple and pear seed, when taken from the pomace or fruit, should be mixed with damp sand, and planted either in autumn or early in spring. If in autumn, the drills should be covered with a sprinkling of old manure, to prevent the surface crusting before they come up, and to increase their growth. Cherry stones should be similarly kept, for if they dry for only a few weeks, they will not grow. They same effect will take place with plum stones, except that they remain dry longer without injury. Peach stones kept fresh will succeed better than old and dry ones, and all seed of stone fruit will germinate better if previously subjected to freezing and thawing. Peach and plum stones grow at once if cracked open at planting, taking special pains not to allow them to dry a moment after cracking.

DEPTH FOR PLANTING—As a general rule, seeds should not be buried to a depth of more than five times their diameter. Apple and pear seeds should be covered nearly an inch, and peach stones nearly

HOME-RAISED TREES—AMATEUR NURSERIES.

two inches. It is important to have a dry, rich soil to receive all the seeds, so that they may be planted before sprouting, or as soon as the frost is out of the ground in spring. Many novices fail because they leave the work till the seeds sprout, or become too dry, or till the soil is too hard and dry to impart to them the needed moisture. Do not plant the seedlings too thickly, or they will be crowded and small—never nearer than an inch or two apart. Keep the soil perfectly clean and the surface mellow through the growing season.

On the approach of winter, the apple seedlings may be taken up and secured in damp moss or sand in the cellar, for winter root-grafting; or they may be left, with other seedlings in the ground till early spring when they are to be set out in the nursery rows.



Fig. 3.

SETTING OUT.—Those which have a single tap-root may be rapidly set out with a dibble, (fig. 1.) by first stretching a cord for each row, and then thrusting the tool into the deep mellow earth to a depth a little greater than the length of the root (the point of which, if previously too long, is clipped with a knife); the root is inserted, and a few thrusts of the tool into the soil fills the hole and presses the earth against the plant. No cavities or interstices are, as in fig. 2, to be left at the lower part of the hole, but all must be compactly filled (fig. 3,) or the roots will be likely to dry and the plants to perish. If the roots are much branching, they cannot be well set out in this way, but a spade must be used for the planting, one man holding each successive seedling by hand against the stretched line, while another covers the roots with the spade, moving backwards along the row. The cultivation must continue through the season, keeping the rows perfectly clear of weeds and the surface mellow, using the hand-hoe when necessary.

BUDDING AND GRAFTING.—Every owner of land should understand budding and grafting, not only for raising young trees in the nursery, but for replacing the tops of any undesirable sorts he may have, or to preserve or grow any better sorts newly obtained. A few brief directions may be

of use, even to those who already understand something of these processes.

Budding is performed in summer, when the bark of the stock will peel or lift from



Fig. 5. Fig. 4.

the wood freely, and the stock must therefore be in a state of vigorous growth. Any person possessing a moderate share of skill may learn to do it in a few minutes. The



Fig. 6.

requisites for success are—1st, and most important, a thrifty stock; 2d, a sufficiently matured bud of the present year's growth; 3d, a smooth face made by shaving off this bud from the shoot, and inserting it smoothly and flatly under the lifted bark of the stock; and 4th, a ligature to hold it there a week or two, till the face of the bud and the face of the new wood of the stock have become firmly glued together. The next spring the stock above

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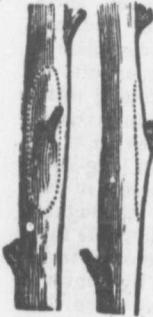


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the inserted bud is cut off, and the bud sends up a new shoot. The accompanying figures will serve to make the whole opera-

operation is not however always absolutely necessary.

It will be observed that in order to do the work well, the knife must be sharp, so as to cut a smooth face to the bud when separated from the shoot; 2d, that the present year's shoot from which the bud is taken should have begun to form its terminal bud, which will show that the buds are ripe enough; 3d, that the ligature must be drawn tight enough to bring the bud and stock into close contact, but not so tight as to cut or bruise the bark; 4th, that the ligature must be taken off when the growth of the stock causes it to cut into or indent the bark.

The time for budding will depend on the condition of the buds and stock, and

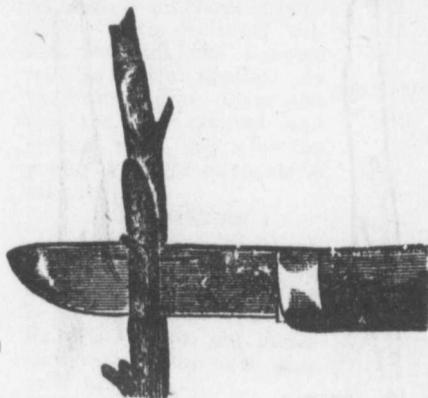


Fig. 7.

tion plain and easily understood to any one who has had no experience. Fig. 4 represents the young shoot (in this instance

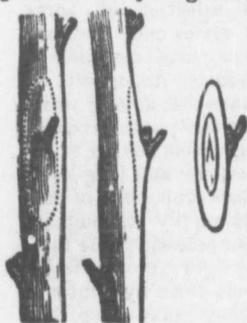


Fig. 9. Fig. 8.

of the pear) from which the buds are to be cut; fig. 5, the appearance of the shoot after the leaves have been cut off, before using; fig. 6, the position in which it is held in the hands for cutting the bud; fig. 7 is an enlarged representation of the process of cutting;

fig. 8, the appearance of the bud

after cut off, while the dotted lines on fig. 9 show where the cut is made; fig. 10 is the cut and opening in the stock before inserting it; fig. 11



Fig. 10. Fig. 11.

is the bud already inserted; and fig. 12 shows the whole process finished, and the ligature in place. The following spring the stock is cut down an inch or two above the bud, and after growing a few weeks the new shoot is tied up to it, as

in fig. 13, to make it straight, and to prevent the wind from breaking it. This



Fig. 12.



Fig. 13.

varies with different kinds of trees. The cherry, for example, will be fit to bud soon after midsummer, and the operation will not succeed if it is left till late in summer, unless the stocks happen to be in an unusually thrifty state. The pear may commonly be budded later than the cherry, and the apple later still; while the peach and dwarf pear are budded near the close of summer, or in early autumn.

Grafting is done in spring before the buds open. The two most common modes are cleft-grafting and whip-grafting; the former where the stock is much larger than the graft, and the latter where both are nearly of the same size. To succeed well the knife must be sharp, so as to cut smooth, even faces: the pressure should bring these faces everywhere into close contact, and all the cut parts must be covered outside with grafting wax or grafting plasters.

Fig. 14 shows the mode of opening the cleft in cleft-grafting, the elbow in the wedged tool allowing it to be driven with a

HOME-RAISED TREES—AMATEUR NURSERIES.

hammer if necessary; fig. 15, the mode of inserting the graft, which is shown in fig.

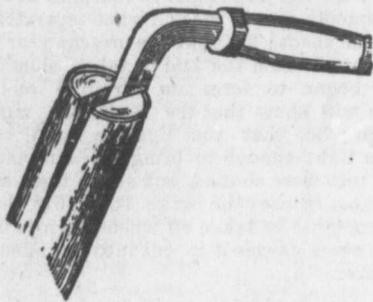


Fig. 14.—OPENING THE CLEFT.

16; while fig. 17 shows the mode of whip-grafting.

Grafting wax is made by melting together rosin, beeswax and tallow. The exact proportions are not essential, provided it is soft enough to adhere with a little applied warmth, and hard enough not to melt in the sun. A good mixture consists of four parts of rosin, three of beeswax and two of tallow; if found too hard, add a



Fig. 15.—CLEFT-GRAFTING.

little more tallow. It may be spread on thin paper or muslin, and applied as plasters, or applied alone.

The operations of budding and grafting are performed essentially in the same manner, whether applied to young trees in the nursery row or to older trees at standard height.

Root-Grafting is adopted by nurserymen, and has the advantage of being performed during the spare time of winter, and the grafts, being set out afterwards into the nursery rows early in spring, grow at once without further care, except training and cultivation. Budding nursery trees usually give better roots and finer trees, but

requires more attention, namely—first, in budding; secondly, removing ligatures,



Fig. 16.—PREPARED GRAFT.



Fig. 17.—WHIP-GRAFTING.

and thirdly, cutting back the stock the following spring.

SELECTION OF VARIETIES.—Everything depends on a good selection of sorts, whether the planter raises and buds and grafts his own trees, or purchases them of others. There are some important requisites in selecting varieties, among which are healthiness of growth, productiveness, sufficient hardiness, agreeable flavour in the fruit, earliness, succession and long-keeping qualities, and a due proportion of each sort to give a constant supply throughout the year. With a poor selection, the inexperienced planter may get crooked, feeble trees; they may be cut down by winter in northern localities; they may give him poor or knotty fruit, or furnish too many at one time of year, and too few, or none, at another.

CURRENTS.

Currants are very hardy, easily propagated, easily managed, produce certain crops of excellent and wholesome fruit which may be used for many purposes, with and without cooking. There is no reason why every family that has a square rod of garden should not have an abundant supply.



Currants are easily propagated by cuttings. A yearling shoot six or eight inches long, which has been cut off close to the old wood, early in spring, is inserted two-thirds of its length into the ground, and it will make a strong well-rooted plant by autumn. To prevent suckers from springing up below the surface of the ground, cut off the buds on the lower part, as shown in fig. 18. The rooted

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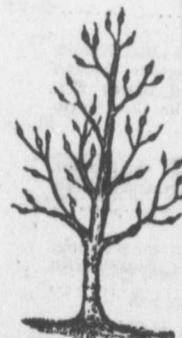


Fig. 20.
top, by which a n

HOME-RAISED TREES—AMATEUR NURSERIES.

plants will be like fig. 19 after a few weeks of growth. Keep the ground well cultivated and properly enriched with manure, and the bushes will bear a profusion of large fruit. With neglected culture the fruit and bunches will be much smaller. As the bushes grow older cut out the old stunted and crooked wood, and allow the young and vigorous shoots to take its place.

GOOSEBERRIES.

Gooseberries are to be cultivated and treated in the same way as currants. Nearly all the English sort being liable to mildew, the American varieties are now generally planted.

Currant Worms are easily kept from gooseberry and currant bushes by promptly dusting them with white hellebore on the first appearance of the insects.



Fig. 19.

RASPBERRIES.

Raspberries are easily propagated and managed, but will not succeed well with neglected treatment. The suckering sorts, including the Antwerps and the many varieties which have sprung from them, reproduce themselves rapidly, and all that is necessary is to secure the suckers and transplant them. On a large scale, nurserymen propagate them by placing short cuttings of the roots in a propagating house with bottom heat, or in a hot-bed. When rooted they are transplanted to open ground. The Blackcap varieties are propagated from the tips of the re-curved shoots, which are fastened to the ground and slightly buried after mid-summer. They root, and are then separated from the original plant and set out.

PEAR TREES.

We give a few hints relative to changing the tops of such sorts as are found poor or unprofitable. The old and common way is to cut off the stem or a few of the larger limbs, and insert a small number of grafts, which, after a lapse of some years will form a new head. A better and more expeditious way is to graft a large number of the smaller limbs over the whole



Fig. 20. top, by which a new head is obtained in a

comparatively short period of time. Large dwarf trees have been thus completely changed into full bearers of the new sorts in three years. Fig. 20 represents the tree with about thirty grafts set in its branches; and fig. 21 a similar tree with only a dozen grafts. The former will form a new head in less time, the latter with less labour.

Feeble or crooked growing pear trees, of such sorts for example as Winter Nelis, Giffard, &c. may be grown in straight, vigorous and handsome shape by grafting on the best stocks at standard height. Fig. 21. Fig. 22 represents young trees of Winter Nelis as frequently seen, showing the crook-

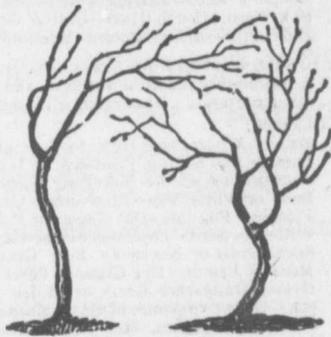


Fig. 22.

ed form when grafted low down, and fig. 23 a tree of the same sort obtained by re-graft-

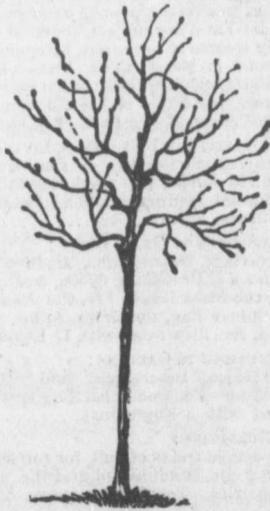


Fig. 23.

ing the top of a Virgalieu which had proved worthless by the cracking of the fruit.

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