tribute this opuscule to the series of "Handbooks of the Farm," by the late John Chalmers Morton, Editor of tho English Agricultural Gazette, and of many other valuable agricultural compilations. In treating of "Ani-mal Nutrition," Mr. Warington says:

"The carbo hydrates (non nitroge nous parts) of the food include starch, sugar, and colluloso; these substances consist of carbon, hydrogen, and oxygon, the last two elements being in the proportion to form water-hence tho name." (In fact, carbo hydrates aro wator + carbon)". Carbo hydrates form the largest part of all vegetable foods. They are capable, when con sumed in excess of immediate requirements, of conversion into fat.

P. 100.- " For the body to increase in weight it is clear that the food supplied must be in excess of the quantity demanded for mere renovation of tissue, and for the production of heat and work. When such an excess of food is given, a part of the albuminoids and ash constituents is converted into new tissue, while a part of the fat, carbo-hydrates, and albuminoids is stored up in the form of fat. P. 102.—" In calculating the amount

of food consumed for the production of heat and work, it has been assumed that the fat in the increase has been derived from the fat and carbo-hydrates supplied by the food.

Mr (Wrightson, Principal of the College of Agriculture, Downton, near Salisbury, England, combines groat scientific acquirements with a thorough practical knowledge of farming The college-farm, which he manages himcelf, contains between 500 and 600 acres, and his usual stock consists of 500 breeding ewes, and 12 to 15 milch cows, besides a number of pigs and fatting beasts. His expression of opinion is concise but emphatic :

"Suyar is a fatting food, and so is starch.

Again, Monsieur Grandeau, a most important figure in the agricultural instruction department of France, has a good deal to say on this question. M. Grandeau is: Director of the "Station agronomiquo" of the East; Inspector-general of the "Stations agronomiques"; Professor at the National Conservatory of arts and trades, and Member of the Higher Council of Agriculture of France, so, I suppose he may be taken as an anthority.

M. Grandoaus first volume on the "Feeding of animals and men" was published in 1893: (the second volume is not out yet). From it I extract the following paragraphs: (Pages 151.) - 'Liebig's conclusions.

-In 1842, Liebig's opinion on the roduction of animal fat may be production abridged thus: 1. He holds that fat is formed in

the body of the animal from the starchy matters (fécule, amidon) from the sugar and nitrogenous matter (fibrin, albumen, vegetable casein.)

2. Fat is produced every time there is a disproportion between the carbon produced by the food and the oxygen absorbed. (When the quantity of the latter is insufficient to burn all the The oxygen of the food secarbon). parates itself by the metamorphosis of certain substances, and escapes under the form of carbonic acid and water.

3. The animal economy in making fat obtains the means of making up for the want of oxygen and heat, both indispensable to the accomplishment of vital action.

4. Rest and housing increase the

production of fat." (P. 175.)—" Liebig had stated that : 1. The fat in food is insufficient to explain the fattening of animals;

2. Fat comes from the transformation

of starch and sugar ; 3. Nitrogenous matter concurs in the formation of fat.

Now, Boussingault, in his work on The fattening of pigs," definitively

confirms these statements of Li big." (P. 178) "III-General conclusions on the origin of fat. The general con-clusions that this retrospective review enables us to establish are briefly these :

1. Plante contain fatty matters.

2. The quantity of fat contained in the food is too trifling to represent the fut found in the animal.

3. Animals have the power of transforming sugar into fat (boos' wax )

4 Animals have the power of transforming starch into fat (pigs, geose, ducks.

5. Nitrogenous matter plays a con sidorable part in the fattening of animals.

Such, in a few words, is the state of the question in 1893; we shall see later that the experiments of Lawes and Gilbert, as well as the numerous experiments of the German school, confirm in all essentials the fundamental hypothesis of Liebig on the origin of animal fat. (P. 361) " In practice as well as in

theory, fat and the starch-series may be considered, say Lawes and Gilbert, as replacing one another in our foods." (P. 312) "Conclusion.—" In short

the masterly essay of Lawes and Gilbert places at the disposal of farmers, chemists and economists the only complete decument we possess on the proba-ble composition of the live brast and on the composition of the increased growth of animals submitted to different kinds of feeding

And now we arrive at our last but most valuable evidence : the experi-ment on "Pig-feeding," conducted conducted by Lawes and Gilbert, at the Roth amsted farm, near St Albars, Hertford shire, England. Any one who will pounds, is FALLACIOUS.' take the trouble to glance at the pages There are a dozen ( (S5 closely printed pages in-8vo.) of the same effect, to be for this series of patient investigations say I have been quoti must see at once that they were drawn up by men thoroughly accustomed to the management of experiments and not likely to be biassed one way or another as are those who, in making tests, have some ulterior object to gain. However, I need say no more as to the perfect trustworthiness of any investigation conducted by Lawes and Gilbert, as their names stand too high throughout the whole civilised world to need my weak support. And now, for a few extracts from the "Experiments on Pig-feeding."

The highly nitrogenous food-a mixturo of equal weights of horse beans

and lentils, was employed. As the comparatively non-nitrogenous food : Indian corn meal.

For the purpose of the experiments, 100 pigs, from 9 to 10 months old were bought, as nearly as possible of the same stamp, and the test was not begun until the pens of 3 pigs each had, by a judicious application of the whip, been taught the wisdom

of living peaceably together. Nors 1 "The grains, as compared with the leguminous seeds, contain scarcely half the quantity of the nitro-genous compounds, but they abound much more in starch and other nonnitrogenous compounds which are believed to provide the chief of the respiratory and fat-forming food of the animal."

Note 2.- 'Indian-corn meal, compared with beans and lentils, contains little nitrogen, but a comparatively large amount of the non-nitrogenous substances of the starch-series (the carbo-bydrate

matter. It is these various non-nitrogonous substances that are supposed more peculiarly to serve for the respiratory process, and for the formation of fat in the animal body."

Nors 3.-" We find that, beyond a somewhat narrow limit, which is attained with almost any of our current fatting-food, any defect is much more likely to be connected with a deficiency of the important non-nitrogenous constituents than of the nitrogenous ones.

Nore 4 - " As these two pigs riponed (i. e. got fat), they naturally se-lected less of the nitrogenous and more of the starchy and fatty food." NOTE 5 — "No one practically ac

quainted with pig-feeding will doubt that the pigs in pens 5 to 8, where the food consisted, in such a very large proportion, of barley-meal, would progress more favourably as to the quality of their increase, or that they would contain a larger proportion of fat, and consequently of dry substance, than these upon the bean and lentil dietaries of pens 1 to 4."

Just so: in England, we fatten upon barley-meal and make the flesh firm by a dictary of pease during the last 3 weeks of the fatting period. 'NOTE 6.— '\* \*\* The difficulty of

determining whether the grossinoroase obtained be composed of fat formed from the starch and oily series of compounds, or whether of flesh from the nitrogenous ones."

" NOTE 7 -The larger the proportion of nitrogenous compounds in the food, the greater the tendency to increase in frame and flesh; but the maturing or ripening of the animal-in fact, its futtening-depends very much on the amount in the food of certain nonnitrogenous constituents."

NOTE 8.—" All our feeding results consistently show, that the theory that assigna to the different substances used as fattening foods, a value in proportion to their per centuge of nitrogenous com-

There are a dozen other notes, to the same effect, to be found in the essay I have been quoting from, but I think I have brought forward enough, and that I may fairly lay claim to have established my point, that THE CARBO HYDRATES OF THE FOOD ARE Sources of Fat in the Animal Eco-ARTHUR R. JENNER FOST. NOMY.

(For the Dairyman Ass 1893)

Garden and Orchard.

TULIPS.

The beautiful display of these bright harbingers of summer, now in bloom suggests that a brief notice of their history may be acceptable.

Perhaps, next to the rose, the family of plants to which the tulips belong lays claim to our admiration.

It is said that in one instance at least tulips were ahead.

The story goes that a young gallant the roses in the world."

Liliacea and Tulipacea, the two great natural orders, of which the Tulip is one type, comprise also many familiar and interesting species, such as, the Lilies, Yuccas or Adam's needle, Neutibles of Court Fortiblanci or Crown Imperial, and the pretty little Dog tooth violet, Erythronome dens canis which has just been so beautifully ombellishing our way- and shalowy hill-sides.

The name Talip is derived from a Persian word signifying a turban and it was no doubt a favourite flower in and also more fatty the Root in past ages.

Some critics consider that the whole Liliaceous family was alluded to in the words of Divine wisdom: "Consider the Lilies of the field how they grow, they toil not, neither do they spin. and yet I say unto you that Solomon; in all his glory, was not arrayed like one of these."

There are only about 30 species of the genus Talipa but the varieties are innumerable, the different species having afforded unusual facilities for their production.

Tulipa Sylvestris.—Tho tulip of the woods or wild tulip, is the type of the family and grows where chalk abounds in Great Britain, France, Switzerland, Italy and Southern Germany. It has the advantage of being sweet-scented and blooms in April and May.

Gesnor's Tulip (Tulipa Gesneriana) was no doubt the first garden species, and probably no flower, except the the roso, has been such a favourite object of the florist's attention. It has een grown in nearly every garden in Europe for centuries.

There are five very distinct varieties or family groups, and from these are produced numerous subvarieties.

The first is the normal Gesneriana, 2 feet high with striped flower; 2nd Gluten bright yellow; 3rd G.plena double, 10 to 15 inches high with va-ringated flowers; 4th G. versicolor, party- coloured, and lastly laciniata, tall growing with variegated potals. The first Garden Talip way found growing wild in Syria and was culti unted by the Tarks. It came from

vated by the Turks. It came from Constanti: ople to Western Europe in 1554 and was systematically described by Conrad Gesner, the great German botanist, a few years later. In 1577 it had begun to make a sensation as a favourito, and in 1603, its finer forms began to appear as the results of care ful hybridizatioa.

This aptitude of the Tulip to assume so many beautiful characters of form or colour, led to ovil results in that little ..... lie of Holland. In that councers so anofound an impression did it make as to lead to what has been called the tulipomania, which was evinced by a desire on the part of Dutchmen of all ranks to possess the newest and finest varieties at whatever cost.

In 1663, and four succeeding years, the mania had assumed such propor tions, as a gambling speculation, as to endanger the credit of the republic.

It was followed not only by merchants, but every one who could speculate, from the nobleman in his palace to the chimney-sweep or old clothes pedlar.

A variety, called Sompor Augustus brought the highest price, being often sold for 2000 florins, (about \$500), and on one occasion about \$1000. A pair of valuable horses, a new carriage, and harness, were given for a single root. "Mariage do ma fille", it is said was so named because one bulb brought enough to enable its owner to give his upon being asked by a lady which he daughter an ample matriage portion. preferred Roses or Tulips; replied, "What fools these mortals be", as "Your Ladysip's Tu-lips before all Pack says. When this mania had passed its day anothor set in. All fioriculture, especially that of tulips, was derided as undignified and foolish and thus the gifts of Heaven were first made instruments to minister to man's meanness and capidity, and then treated with contempt, as being suitable only to the uncducated and vulgar, and the flower more gorgeous than "Solomon in all his glory," challenging "Solomon in all his glory," challenging the admiration of all, and directing the burning thought of man to Heaven, was neglected and despised.

Happily this insane projudice also od out and talips he again resumed died out and tulips he