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THE OTTAWA NATURALIST.

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THE OTTAWA NATURALIST.

VOL. X.

OTTAWA, OCTOBER, 1896.

No. 7.

PETROGRAPHICAL NOTES ON SOME ARCHÆAN ROCKS FROM CHELSEA, QUE.

By JOHN A. DRESSER, M.A.

Principal of St. Francis College, Richmond, Que.

NO. 1. SERPENTINE LIMESTONE.*

By the aid of the microscope this rock is seen to consist essentially of the minerals calcite and serpentine, and to have muscovite and a few grains of iron ore as accessory constituents.

The calcite is wholly crystalline and shows rhombohedral cleavage throughout. It is more or less turbid in some parts, evidently from the presence of small inclusions of graphite-like matter, which are elsewhere absent. Such inclusions, when they occur in well-defined areas, are indicative of fossil origin, and even their presence in irregular aggregations may be so interpreted.

In this specimen, however, the inclusions appear in gradually varying quantities in a part of the section, but nowhere in areas having any definite boundaries. They are in fact, only more or less freely disseminated through parts of the rock, but not in such a way as to give any satisfactory evidence of an organic origin of the calcite, which may therefore be considered a secondary constituent.

The serpentine is colorless, except in polarized light, when it shows dull colors and aggregate polarization. It occupies somewhat rounded areas, which have rather uniform boundary lines.

*Nos. 1 and 3 are from "the Ravine," Old Chelsea, Que. No. 3 rock is from a 4 to 7-inch dyke cutting No. 1. No. 2 is from the first railway cutting north of Chelsea Station, Gatineau Valley Railway. These specimens were all collected by Dr. Ami. The microsections were prepared by Mr. McNamee, of Buffalo, N. Y.

As serpentine is a secondary mineral, that is it has been formed by the decomposition of some constituent of the rock, its origin must always offer a question of interest. This can only be determined by finding a part of the parent mineral still remaining, in or around it, or by recognizing the crystallographic outline or traces of its cleavage form, in the pseudomorphic serpentine. A careful examination in this case shows the alteration to serpentine to be complete. This fact together with what has been said of the outlines of the serpentine areas, precludes all evidence from the first and second sources that have been mentioned.

The serpentine, however, shows in polarized light series of white lines often intersecting and thus forming what is known as "grating" or "window" structure.

These lines are narrow bands of fibrous serpentine running along the lines of cleavage of the original mineral whose position and direction they thus indicate.

In several grains of serpentine these lines are seen to intersect quite regularly at an angle of 120° - 130° , thus strongly suggesting a basal section of hornblende, whose cleavage lines intersect at 124° - 125° . Hornblende is not an unusual source of serpentine although its more common origin is olivine.

Muscovite appears in several smaller grains, sometimes enclosed in the serpentine or calcite, but more frequently lying between them.

A few grains are present possessing a bright metallic lustre in incident light, and surrounded by yellowish-brown rims. They are probably pyrite. Magnetite is also probably present. All, however, are so small in size and so few in number as to be relatively unimportant.

With regard to the origin of this rock, two alternatives present themselves :

(1) If the inclusions before mentioned could be accepted as evidence of organic origin, the calcite would be regarded as a

primary constituent, and the whole, a sedimentary rock. We should then have only to account for the presence of the serpentine.

(2) On the other hand, as the calcite does not offer such evidence, the better explanation seems to be that the calcite has been produced by the decomposition of some of the feldspars, and, the serpentine having been derived from hornblende, (which again, may have been primarily pyroxene), the original rock had the composition of hornblende—(or augite)—diorite or syenite.

This view is also in a measure corroborated by a reference to the investigations of Mr. Ingall, (Can. Rec. Sci. Vol. VI, No. 2) in the pure limestone beds of the Laurentian system.

Serpentine limestones are well-known members of the Grenville series in Canada, and of its equivalent in the Adirondack Mountain region of New York.

Their occurrence in the latter district has been fully described by Prof. Kemp, while the Canadian localities have been made well-known by the officers of the Geological Survey Department.*

NO. 2. SILLIMANITE GNEISS.

The essential constituents of this rock are feldspar, biotite quartz and sillimanite; the accessory, garnet and pyrite.

The feldspar is much decomposed and seems to be mostly orthoclase. No plagioclase can be surely identified. Biotite is very prominent in the thin section.

Both prismatic and basal sections are abundant. The former show well-marked cleavage and parallel extinction, and all have distinct pleochroism.

Quartz is present in grains of various sizes several having a rounded or somewhat elongated form. Some of the larger

*See "Catalogue of Stratigraphical Collection of Canadian Rocks," by W. F. Ferrier—1893.

show a slight undulatory extinction thus indicating that the rock has been subjected to pressure since their formation.

Sillimanite presents some of the largest individual crystals of the section. It occurs in longitudinal sections some of which show parallel cleavage, and all, parallel extinction. Both the single and the double refraction are high, which give it a prominent appearance in the slide. No distinct pleochroism has been observed. Several of the crystals are broken. One basal section is present with a nearly rectangular outline and showing distinct diagonal, (*i. e.* parallel to the macropinacoid), cleavage.

A few grains of red garnet and pyrite are enclosed by biotite.

The structure of the rock is schistose and it may be termed a sillimanite gneiss.

A rock of this class from St. Jean de Matha, Que., recently described by Dr. F. D. Adams, (*Am. Jour. Sci.* July, 1895), has been determined by him to be in all probability an altered sedimentary rock of a very old formation. It differs from the present specimen chiefly in having a greater amount of garnet and less biotite.

This rock is also a common constituent of the Grenville and other metamorphic series.

NO. 3. OLIVINE DIABASE.

This rock consists essentially of plagioclase, augite and olivine, with a few grains of iron ore as an accessory constituent. While apparently semi-crystalline it probably possesses an ophitic or true diabasic structure.

The feldspar is for the most part fresh and well preserved and occurs both as lath-shaped crystals enclosing triangular areas of augite and other minerals, and as minute individuals of the same form in a dark groundmass. A few of the larger

crystals show incipient alteration to calcite. These may be orthoclase, but the rest are undoubtedly plagioclase.

Augite is also present in considerable quantity, generally in larger individuals. They are often penetrated by crystals of plagioclase thus proving the earlier crystallization of the latter.

One basal section is seen showing the characteristic cleavage nearly at right angles, and extinction parallel to the diagonals.

Some of the olivine crystals have been completely altered to serpentine. Both the olivine, and the serpentine which replaces it, contain inclusions of some kind of iron ore in small grains.

What is apparently the groundmass of the rock consists of minute slender plagioclase crystals, fine opaque grains probably of iron, and a light-brown glass. This is isotropic in polarized light and tends to give the rock, which has otherwise an ophitic structure, the appearance of a melaphyre.

On the other hand, while the section examined is in no part quite holocrystalline, it is very nearly so in several places and is therefore, probably, better classed as an olivine diabase.

This is a volcanic rock which commonly occurs amongst rocks of all ages from Pre-Cambrian to Mesozoic.

St. Francis College, Richmond, Que., July 29th, 1896.

NOTES ON BIRD LIFE IN AUTUMN.

By Miss A. C. TYNDALL.

Through the late summer and autumn months, there are always odd specimens of our summer visitants to be found in the woods, whom various mishaps and accidents have prevented from going south with their fellows, and though some of them may be able to join their comrades later, the question of the future with the majority resolves itself into that of a lingering death of

cold and starvation, with the pleasant alternative of furnishing a meal for an owl or hawk.

The thrushes, as a rule, appear very unfortunate in getting left behind thus, perhaps owing to the fact that they for the most part, are not as careful for their personal safety as the greater number of birds. although the robin, with all his wariness and settled distrust of his fellow creatures, is to be found as often as any on the list of the disabled; the woodpeckers, whose variegated plumage affords such a tempting target for the small boy with the gun, are not seldom to be met with among the wounded, and even the quickwitted little house-wrens, with all their nimbleness, are not always able to avoid mishap. Some of our native sparrows are always to be found among the unseasonable sojourners in the dreary month of November, but with them it appears to be more often late moulting and its consequent ill health than any other reason, that keep them here.

As I go out on a late autumn morning to see what the birds are doing, one of the first I find, down in a little thicket on the edge of the fields, is a white-crowned sparrow, sleek and well kept as usual, with not a feather out of place; but he is a belated traveller, who was due at southern resorts, where his friends have gone, some time since, yet owing to some cause or other of detention he is only on his way there now.

A little distance away, on a fence rail, is a shivering ball of feathers which turns out on a nearer view to be a song sparrow minus the tail. He is an old bird, who is late with his moulting, and is evidently feeling far from well. The cold affects him as it does not his fellows who are in possession of their winter coats; if a shrike or sparrow-hawk should happen along now he would fall an easy prey, for he looks dull and stupid, and rustles slowly off through the dead leaves on my approach, as if he does not much care whether danger is near or not.

I found a robin in the woods one autumn day, who appealed strongly to my sympathies. He had been brought down from

his high estate as one of the birds of the air by a broken wing, and had nothing else to look forward to than spending the rest of his life on the ground, enduring the increasing cold, and keeping out of the sight of hungry birds and beasts of prey as best he might. Poor Robin, he was perched on a dead branch projecting from a pile of brushwood on the sunny side of when I found him, and looked very forlorn and disconsolate, as well he might. He was comparatively comfortable then, the day not being very cold, but later, when the keen winds of November would penetrate to even the snugger nooks and corners of the thickets, this lone waif of the woods might have reason to look even more sorrowful than he did then. I captured him after a long chase, for the instinct of self preservation was still strong in him despite his hopeless look, and he ran nimbly and well. The large bone of the wing, near the joint where it curves downward, had been broken by birdshot, and for his misfortune there was no cure.

Another unfortunate that I met with in a late summer's tramp, was a crippled olive-backed thrush, who seemed as far as I could judge to be suffering from paralysis, or some such affliction, the one side of the bird being shrivelled and withered to mere skin and bone while the other was plump and well proportioned, and a post mortem examination revealed not a wound or bruise that might have caused such a condition, not even a feather being out of place; though his means of locomotion were confined to one leg and one wing.

Such a case as this is rare, but most of the birds to be found in the woods at this time of year appear to suffer more or less from the changed conditions of life at this season, and to feel the dreariness of the short days and long cold nights much as we ourselves do. The most cheerful sounds to be heard in the woods at this time of year, are the clear, if somewhat shrill, notes of the woodpeckers, which have in them a suggestion of

health and strength to meet winter's hardships to be heard in few other bird voices.

The various little finches, and most of the smaller birds who pass the winter with us, are more or less plaintive-voiced, and even the notes of the ever busy and lively little chickadee, coming through the deserted woods on a late autumn day, never fail to remind one of the gloomy season.

SOIL INOCULATION BY NITRAGIN.

By F. T. SHUTT, Esq., M.A., F.C.S.

Discoveries of the greatest importance to the farming world have of late years resulted from the application of chemistry and bacteriology to the solution of agricultural problems. Notable among these has been the demonstration by the celebrated German scientist, Hellriegel, that the free nitrogen of the atmosphere may be utilized by members of the leguminosæ (clover, peas, beans, etc.) through the agency of certain micro-organisms present in the soil. As far as we are aware, only plants of this botanical order can make this use of atmospheric nitrogen, and their ability to do so depends on the presence of these minute organisms that live in nodules upon their rootlets. The establishment of this fact is not merely of scientific importance; it has a practical and commercial aspect of great value. It has shown the way to soil enrichment in one of the essential and indeed the most costly element of plant food.

Perhaps the most economical method of increasing the percentage of available soil nitrogen is at present by plowing under a growing crop of one of these plants, for the nitrogen they possess has for the most part been gathered from the air. Day by day they have stored this nitrogen in their roots, stems and

leaves, and this they furnish, when plowed under, in an available form as food for succeeding crops—a princely legacy to future generations of plants.

When the nodules and their inhabitants are not present, clover, peas, etc., must, like all other plants, obtain all their nitrogen from the soil. Further, it is to be noted that these micro-organisms are not to be found in all soils. The question of introducing them economically, therefore, naturally presents itself as one worthy of research.

The first experiments towards this end consisted in taking soil from a field upon which a legume possessing an abundance of nodules had been grown, and sowing it on the field to be impregnated. This was practically soil inoculation, and, though the plan proved eminently satisfactory, the carrying out of it was in many instances costly and cumbersome. Dr. Nobbe, of Tharand, Saxony, was the one who first made this practical application of Hellriegel's discovery. He, however, did not stop there, but as we now have to chronicle, he prepared "pure cultures" of these nitrogen-converting organisms, by methods well known to bacteriologists. These cultures or preparations are now made on a commercial scale, so that a sufficient quantity to inoculate an acre can be bought in Germany for \$1.25. The members of the leguminosæ have, it would appear, each their own peculiar bacteria or micro-organisms; and it has been shown that those influencing the assimilation of nitrogen in the clover plant are of no value for the pea crop, and vice versa. Hence the necessity for the preparation of cultures of clover bacteria, pea bacteria, and so on; and these must be used according to the effect desired, or, in other words, according to the crop to be sown.

These cultures consist of "colonies" of these organisms and the preparation has been named *Nitragin*. The practical application of *Nitragin* has been tried in two ways: first, by

diluting it with sufficient water and sprinkling the seed with the fluid ; and secondly, by treating a quantity of soil with a dilute solution of the preparation, allowing the soil to dry and then spreading it evenly over the field to be inoculated, which is then deeply harrowed

It is yet too soon to speak of results, but the probabilities are that the experiments now being carried on in Germany and England with this agent will prove successful. The knowledge of the conversion of inert nitrogen by the instrumentality of bacteria and the legumes into a form readily convertible for the growth of cereals, root crops and fruits, is, certainly the most valuable gift that science has made to agriculture this century, and Dr. Nobbe, if successful in his experiments, will have earned the thanks of the farming community for giving them a practical application of this knowledge—a cheap method of entrapping this, as far as most farm crops are concerned, valueless nitrogen.

BOOK NOTICE.

ECONOMIC ENTOMOLOGY *for the Farmer and Fruit-growers and for use as a text book in Agricultural Schools and Colleges ;* by John B. Smith, D. Sc.

Practical Entomology, or the study of insects and their life-histories with a view of controlling or preventing altogether the ravages of such species as injure cultivated crops, may be called a new science. In no country has so much good work been done in this line as in North America, so that to-day it may be fairly said that any farmer or gardener in the United States or Canada who finds his crops are being injured by insects pests can, upon applying to accessible authorities, be pretty sure of receiving reliable information as to the best methods to adopt to

save loss. Extensive as the losses from insects undoubtedly are every year, there was not until the present time any one book in which a farmer could hope to find mentioned all the common pests that come before him in his yearly operations. This conspicuous want has now been supplied by Dr. J. B. Smith, the Entomologist to the New Jersey Agricultural College and Experiment Station, and Professor of Entomology at Rutgers's College. Dr. Smith has been for many years one of our leading authorities on practical entomology so that the present work gives not only what is well known about the insects treated of, but contains also the latest results of his own long experience. In his introduction the author points out that Economic Entomology is a science as yet hardly systematized, made up of fragments published in different places and frequently contradictory as to remedial measures suggested

There have been books of information concerning insect enemies of certain crops or kinds of crops, but no one work gave the agriculturist and the student of economic entomology the basic knowledge that would enable him to recognize the nature of an insect he found causing injury or to decide what kind of remedies against it should be applied.

The present work consists of three parts : the first is devoted to Structure and Classification of Insects, and contains a chapter on their Growth and Metamorphoses. The second and main part of the volume is entitled the Insect World, and gives a succinct and well-balanced account of all the different natural orders into which insects are divided. Here are found mentioned in their proper places and for the most part illustrated with excellent figures, all the well-known injurious species, together with indications of the best remedies. In this division the author acknowledges assistance in the preparation of the chapter on Hymenoptera from Dr. L. O. Howard, the U. S. Entomologist, and in that on Orthoptera from Prof. Lawrence Bruner. The

third part is given up to a consideration of Insecticides, Preventives and the machinery used by the economic entomologist. An interesting chapter treats also of Predaceous and Parasitic Insects and Fungous Diseases.

Prof. Smith's book is an octavo volume of 481 pages published by the J. B. Lippincott Co., of Philadelphia, and therefore well printed on good paper and well got up generally. There is a profusion of excellent illustrations (483), many of which were prepared specially for this work.

We feel assured that this useful work by our esteemed corresponding member will be gladly welcomed by the large number of farmers, gardeners and students who are so frequently applying to booksellers and others for a work of this nature upon economic entomology. J. F.

NOTES, REVIEWS AND COMMENTS.

A. A. A. S.—The forty-fifth meeting of the Amer. Assoc. Adv. Sc. was held in the City of Buffalo, N. Y., on August 22nd to 29th, 1895, but was not as well attended as usual. The meeting is reported an excellent one. Among the Canadians present were: Mr. J. F. Whiteaves, Palæontologist and Zoologist, Geological Survey of Canada, Ottawa; Prof. John Galbraith, University of Toronto, Toronto, Ont.; Dr. James Fletcher, F.R.S.C., F.L.S., Entomologist, Central Exp. Farm, Ottawa; Dr. Bethune, Port Hope, Ont.; Mr. A. F. Hunter, Barrie, Ont; Henry Lampard, Esq., Montreal; John Craig, Esq., Central Exp. Farm, Ottawa.

One of the most interesting features of the meeting was the tribute paid to the venerable geologist and palæontologist, Prof. James Hall, State Geologist of New York for the past sixty years.

We extend to Prof. Hall our sincere congratulations from this side of the line and do ourselves much honour in joining the number of those who have testified to the marvellous amount of work done so well by such a distinguished student of science. His is an unprecedented career in which we all rejoice. H.M.A.

CANU. F.—“*Essai de Paleogeographie.*” Atlas, Paris, 1895. This is a very interesting volume giving the restoration of the contours of ancient seas in France and adjoining countries. It treats of the geographical outline of that country in each successive period beginning with the Devonian period through the Carboniferous, Permian and Triassic times on to more recent periods, shows the encroachment and recession of the Mediterranean Sea and Atlantic Ocean margins—also the various lands and islands of those bye-gone seas. It is a remarkably fine work of reference for similar researches and deductions in other countries. H.M.A.

OTTAWA FIELD-NATURALISTS' CLUB.

LAST EXCURSION OF THE SEASON TO GALETTA, ONT.

SEPTEMBER 26.—The third and last excursion of the season was held to Galetta and Marshall's Bay on the Mississippi and Ottawa rivers respectively, where a pleasant and enjoyable time was spent in the untrodden paths of nature. The party left Ottawa by 8 a.m. train over the Ottawa Arnprior & Parry Sound Railway, and passed through the townships of Huntley, March and Fitzroy. At Carp station a short halt was called to allow the members present to examine the Pleistocene gravels occurring immediately south of the station and to collect some of the fossil remains entombed in them. Shortly after this the pretty little village of Galetta was reached and the road taken

leading to the left bank of the Mississippi river which was followed down to its mouth, at Marshall's Bay. In the absence of the president, Dr. H. M. Ami was in charge of the party, and before scattering in the woods and forest adjoining gave out the programme of the day, pointing out the leaders who would take charge of the various branches of the Club's work. Mr. W. J. Wilson of the Geological Survey led the geologists and before evening was able to report some very good finds. Principal Honeyman, of the Aylmer Academy, led the botanists and furnished the Editor of the OTTAWA NATURALIST with an interesting list of the species of plants observed and collected during the day. Miss G. Harmer took charge of the department of Ornithology and answered any question put to her regarding the feathered denizens of the forest observed. The Mississippi river was found to teem with recent shells, several species of Unios and other forms having been noted. At noon a halt for lunch was made on the shore of Marshall's Bay. After a tramp of between five and six miles the party reassembled at the lovely pine grove just west of the village. Here the customary remarks on the finds of the day were made by the leaders. Dr. Ami congratulated the members present on the result of the day's outing inasmuch as the contents of the collecting basket, vasculum and press were numerous and interesting. He remarked that this was a truly naturalists' excursion because every member present had been an ardent naturalist and had collected specimens or done something to promote the object of the Club.

Mr. W. J. Wilson was then called upon and described the geological formations characterizing the Post-Tertiary System met during the day. The species of marine shells obtained at Carp station comprised the following: *Saxicava rugosa*, Linnaeus; *Macoma fragilis*, Fabricius, besides the cirripede: *Balanus crenatus*, Bruguière.

These were found in a coarse gravel made up, for the most part, of Archaean débris. Boulders of crystalline lime-

stone, of diorite, granites and gneisses were seen imbedded in an arenaceous matrix and associated with the remains of marine shells above enumerated. At Moore's Corners, a little to the south-east of Galetta, the Geological section examined an interesting sand and clay terrace which was found to hold also remains of sea shells. *Macoma fragilis*, Fabricius and *Saxicava rugosa* Linnæus were the only two species observed but they occur in great abundance. In the bottom of the valley of the Mississippi river, the Archaean rocks are beautifully striated and glaciated wherever a fresh outcrop occurs. These glaciated Archaean rocks are themselves overlain by "boulder clay" or "till." Over the "boulder clay" we found stratified sands, probably of marine origin, and these sands in turn overlain by marine clays. No fossil remains were found in the clays or underlying sands but in the uppermost sands the marine shells occurred. Below the village of Galetta the glacial striae were observed by Mr. Wilson to run in a general north-west and south-east direction. The drift boulders were all Archaean.

On behalf of the section of botany Principal Honeyman followed and in the course of his remarks stated how pleased he was to be a member of the Club. It was the first excursion which he had attended as yet but he had enjoyed himself and obtained quite a series of plants which he had not formerly in his herbarium. His former field of botanical studies was in the Richmond district of the Eastern Townships of Quebec. The plants observed this day, were most interesting and comprise the following :

Ranunculaceae.

Anemone Pennsylvanica,	Ranunculus acris,
R. Pennsylvanicus,	R. Flammula var, reptans.

Compositae.

Artemisia vulgaris,	Bidens cernua,
Helenium autumnale,	Erigeron Canadense,
F. Philadelphicum,	Achillæa millefolium,
Anthemis Cotula,	Taraxacum dens-leonis.

Rosaceae :

Spiraea tomentosa,	Potentilla argentea,
P. fruticosa,	P. Norvegica.

Besides the above the following were noted, recorded or collected between Galetta and Marshall's Bay :

Solanum nigrum,	Gentiana Andrewsii,
Echium vulgare,	Euphorbia maculata,
Zanthoxylum Americanum,	Hypericum mutilum,
Ilex verticillata,	Cephalanthus occidentalis,
Viburnum lentago,	Oenothera pumila,
Portulaca oleracea,	Ampelopsis quinquefolia,
Vitis riparia,	Monotropa unifloram,
Trifolium pratense,	Cannabis sativa,
Xanthium Canadense,	Lepidium intermedium,
Capsella bursa-pastoris,	Osmunda regalis,

Myrica Gale.

Miss Harmer then addressed the members present on behalf of the leaders in Ornithology. The various species of birds observed during the day were noted ; for the most part as birds of passage. A number of questions were put to Miss Harmer who replied to each one in turn. The interest manifested in this branch of the Club's work is very encouraging.

Dr. Ami then gave a brief outline of the results obtained and described certain features in the geology of Galetta. The party left by the 17.27 train for home and arrived in the capital shortly after 18 o'clock, having thoroughly enjoyed the day's outing in the westerly limits of the County of Carleton.

H. M. A.

October 30th. 1896.

NEW MEMBERS.

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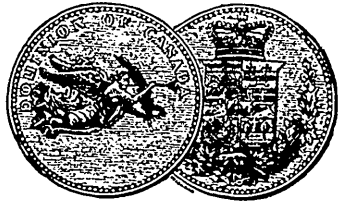
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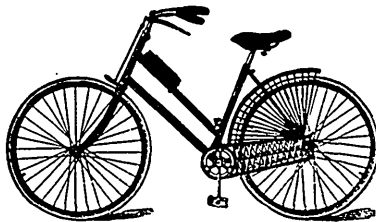
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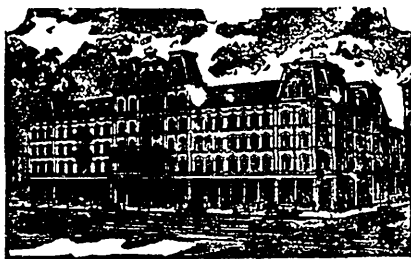
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