BRANCHIOPOD CRUSTACEANS.

Unquestionably the most interesting group of all crustaceans (crabs, lobsters, shrimps, etc.) are the branchiopods or branchipeds. They occur in salt and fresh water, and usually in great numbers. When taken out of the pool with a common dipper and dropped into a glass jar with some water, their most graceful motions can be observed at leisure. They swim slowly backward, incessantly paddling with their branchial feet, of which there are usually eleven pairs on either side of the upper body. Each of the leaf-like feet has a sort of a gill attached for breathing, in the shape of an oval fleshy lobe. The head is rounded, and has two large stalked eyes at the sides. A little above the eyes there is on either side a thin delicate antenna, or organ for feeling. The tips of the feelers are beset with microscopically small touch-globules and bristles. A little below the eye stalks there are a pair of claspers, often with hooks, large in the male, and small and simple in the female. The male claspers are sometimes flat and curiously branched, as in the genus *Streptocephalus*, Fig. 6.

Between the male claspers there are often two fleshy lobe-like tongues, which are usually found coiled spirally beneath the head. These fleshy processes are curiously branched in the genus *Chirocephalus*, Figs. 5 and 7. The mouth is closed by a pair of minute jaws, which, when viewed under the microscope, look like two currycombs. Below these there are two more pairs of very minute jaws.

All members pertaining to this family take their food from the soil of the ponds or pools in which they occur. They occasionally strike against the mud, whirling it up, thus getting a quantity into the external channel between their feet. The motion of the latter is such as to gradually drive the mud toward the head, and microscopic organic matter (algæ, etc.) contained therein enters the mouth and stomach. F. Spangenberg, Ph.D., first mentioned this fact in 1875, and I have frequently observed the same in *Eubranchipus*, *Streptocephalus watsonii P.*, etc. Under no circumstances will they ever partake of chopped meat or bread placed in the aquarium; for as soon as the decomposition of the meat begins, all the individuals will die.

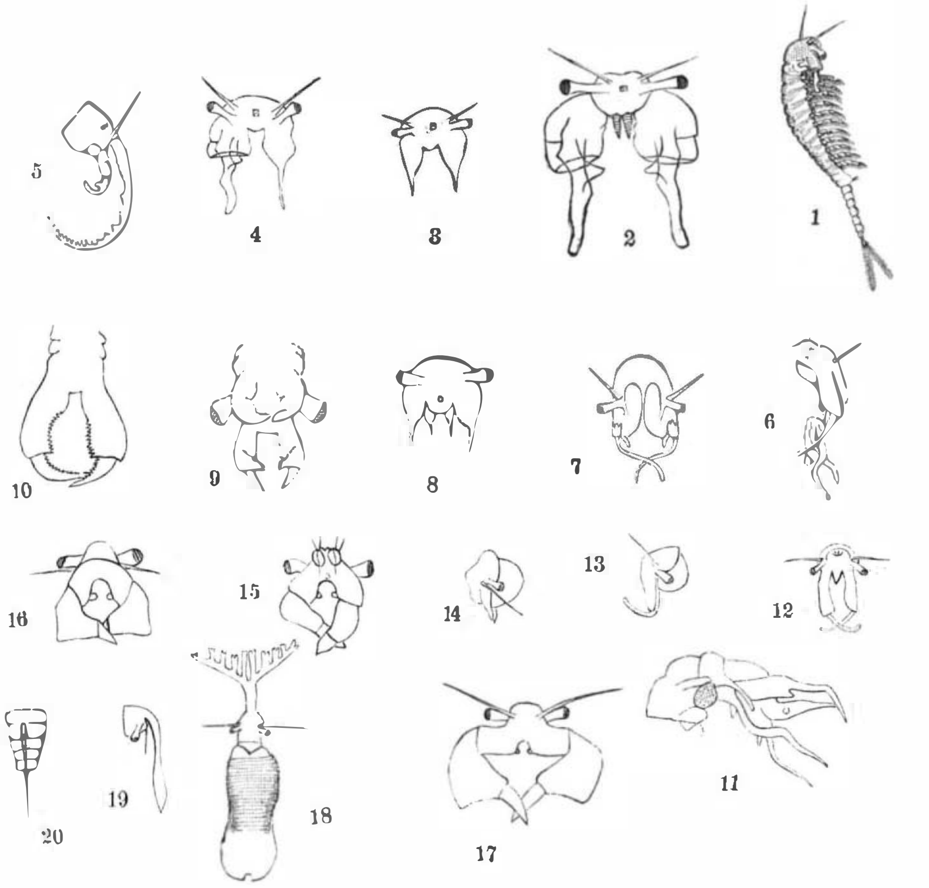
Just below the last pair of branchial feet the external sexual organs may be seen, contained in two united segments. Below the sexual organs is a cylindrical prolongation of the body, the so-called post-abdomen, to which the two united sexual segments also belong. The post-abdomen ends usually with a furca or terminal fork. The latter consists of two more or less long, flat, and stiff bristles fringed with finer bristles (setæ).

The furca undergoes great changes in salt water species according to the density of the water; the furca is therefore of but little value in the determination of species. In *Thamnocephalus*, Fig. 20, we find a rudder-like, flat, broad appendage instead of a terminal fork, the latter being but faintly indicated by a median notch. Some branchiopods occur in the hot season only; others, like *Eubranchipus vernalis*, Verrill, Fig. 1, only in winter. In midwinter, when mild weather sets in, and the thin coat of ice gradually melts away, *Eubranchipus* can be seen by the thousands near Maspeth, L. I., in ponds along the railroad track. They are of various hues of red, more or less transparent, and measure about one inch in length when full grown. The female drops her eggs every few days; the latter are dark brown, spherical, and finely granulated. The eggs of other genera form perfect mathematical figures, and are very peculiar. The smaller pools nearly all dry up in the hot season, being occasionally filled by rains. *Eubranchipus* are supposed to be a relic of the ice age, and are never seen in summer.

The eggs of branchiopod crustaceans show the singular phenomenon of hatching only after having once been dried up. Perfectly dry mud from the pools in which they occur will develop the eggs contained therein, after adding water, in a tumbler or jar, within two or three days. The young at first look entirely different from the adult, and swim about very actively. They shed their skin a number of times, and every time reappear with an additional growth of feet and increased body, until mature.

CARL F. GISSLER, Ph.D.

Brooklyn, N. Y.



1. *Eubranchipus vernalis*, Verrill. Male, about twice natural size. Author's drawing.—2. Head of *Eubranchipus*. Male, much enlarged. front view. After Verrill.—3. Head of *Eubranchipus*. Female, slightly enlarged. Author's drawing.—4. Head of a hermaphrodite of *Eubranchipus*. Male and female claspers on one and the same animal. Sexual organs accordingly. Author's drawing.—5. Head of *Chirocephalus*, Holmani. After Ryder. Lateral view of male. From Woodbury, N. J.—6. Head of *Streptocephalus sealii*. After Ryder. Side view of male. From same locality.—7. Same as Fig. 5. Front view.—8. Same as 5. Female, front view.—9. Head of *Branchinecta arctica*, Verrill. Male. From Labrador. 10. Head of *Branchinecta grœnlandica*, Verrill. Male. From Greenland.—11. Head of *Streptocephalus texanus*, Packard. Male. From Texas.—12. Head of *Branchinecta coloradensis*, Packard. Male. From Colorado.—13. Head of 12. Side view.—14. Head of female of 12. Side view.—15. Head of *Artemia gracilis*, Verrill. Male. Connecticut and Massachusetts. In salt water. 16. Head of *Artemia monica*, Verrill. Male. Mono Lake, Cal.—17. Head of *Artemia fertilis*, Verrill. Male. Great Salt Lake, Utah.—18. *Thamnocephalus platyurus*, Packard. Entire male. Half of natural size. Seen from above. Kansas.—19. Head of female of the same. Side view.—20. Side view of the last few segments of abdomen with telson of 18.

BRANCHIOPOD CRUSTACEANS.

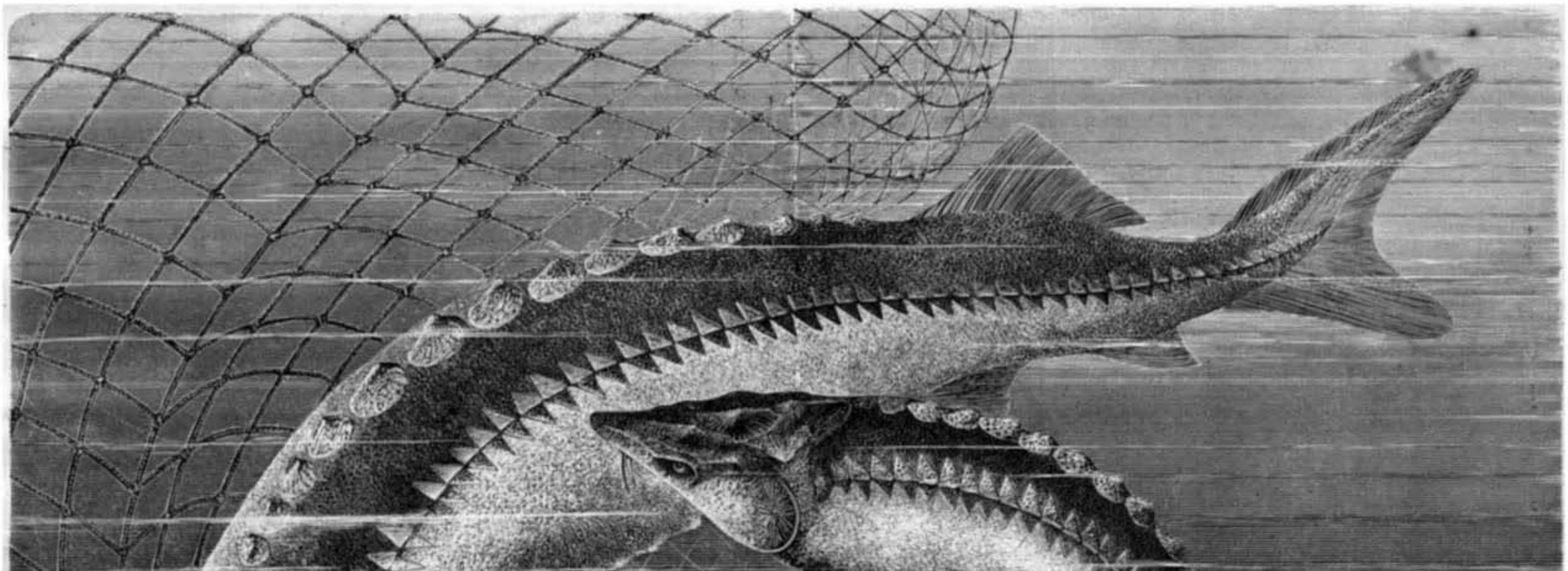
THE STURGEON FAMILY.

This family of fish have no bones like the cod, salmon, herring, etc., but, instead, have soft flexible gristle. The sturgeon is for some countries as important as the salmon, and is most common in Eastern Europe, living both in the sea and the large lakes, and at certain seasons of the year ascends the rivers in large schools.

In Russia a large proportion of the population is supported by the sturgeon fisheries, where it is salted, smoked, sun-dried. From it is obtained the Russian isinglass and caviare. All attempts to hatch sturgeon eggs and raise the fish artificially have so far been failures.

The finest kind of sturgeon (of Europe), whose flesh is almost as high-priced as that of the salmon, is the sterlet (*Acipenser ruthenus*), which seldom measures more than two feet, and averages eight and a half pounds, is found in the Danube, Salzach, the Drau, and Dniester. From its air bladder the finest isinglass is made, and from its roe the finest caviare.

The Prussian Ministry of Agriculture, in 1872, accepted an offer from De Koch, of St. Petersburgh, to plant 100,000 young sterlets from the Volga in the rivers of Germany, especially in the piscicultural establishments. With our American sturgeon great confusion has resulted in determining the different species, from basing them on cha-



THE STURGEON FAMILY—(*Acipenserini.*)

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racters of insufficient value, and from the fact of the differences in appearance existing between the old and young. In the young the snout is long and slender, which, by being absorbed or failing to grow as fast as the rest of the body, with the larger sturgeons presents a blunt form. In some the shields or plates in the young are well developed, which, as they become more mature, disappear. Santher speaks of the same tendency occurring with the European sturgeon. In numbers the sturgeon will compare favorably with any of our staple food fishes. As an article of food in the fresh state they are not generally popular, as few people understand the various methods of cooking. The Canadian-French prepare a soup from the flesh which has much the flavor of chicken soup, but being very rich requires a strong stomach to retain it. A very good pickle is made by first boiling the flesh and afterwards pickling it in vinegar. But undoubtedly the best method of preparing the flesh is by smoking. The sturgeon are first skinned and the viscera taken out, after which the thick parts are cut into strips and placed in strong brine, and for a short time smoked over a close fire. The demand for smoked sturgeon is very constant and on the increase. It is best to smoke only small quantities at a time, as it is apt to become rancid. The thin portions and offal are boiled down for oil. From the roe is manufactured the American caviare, of which imme seiquantities are shipped to Europe. The caviar is prepared in the following manner: After tearing away the enveloping membrane the eggs are placed on a horse-hair sieve, the mesh of which is sufficiently large to allow the eggs to drop through after being stirred around in one direction with the palm of the hand; this is continued till all the roe has passed through and are entirely free of all membrane and fatty material, after which they are placed in a salt pickle (made from the best of salt) for a length of time, which is regulated according to temperature and season of the year. After coming out of the pickle it is placed on trays or cloths to drain off previous to being packed in barrels.

The Kauri Gum of New Zealand.

Consul Griffin, of Auckland, makes an interesting report to the State Department, from which we make the following extracts, on the product of the kauri gum, which is so extensively used in the United States for the manufacture of varnish. It consists of the dried and solidified sap of the kauri tree, a species of pine known to botanists as the *Demerara australis*. It does not exist in any other part of the world. It is found only in the province of Auckland, in that part of the colony lying to the northward of the thirty-ninth degree of south latitude.

It was the opinion of many for a long time that kauri gum is a fossil article, like amber, and is no longer being produced. This, of course, is a mistake, but it is nevertheless true that the best and by far the largest quantity of merchantable kauri gum is dug out of the ground. It is found at various depths, from just above the surface of the soil to many feet below the surface. It is found on bare hillsides, on flat clay lands, in swamps, and even in some places that are covered with a more or less thick coating of volcanic *débris*.

Sometimes the gum is found in small detached lumps, and at other times large deposits will be found in one hole. On cultivated land it is not unfrequently turned up by the plow, and in many places cutting large drains in swamps has revealed large deposits of this vegetable product.

In the forks of the large branches deposits varying from a few pounds to nearly a hundredweight are sometimes met with. When a kauri tree is cut in the bark, even the largest and oldest of them, varying in diameter from six to ten or twelve feet, it will bleed like a young sapling. In a few weeks, if the weather be dry, a large mass of half-dried gum will have oozed from the wound, not unfrequently appearing in the form of a great, thick band, reaching from the wound to the surface of the soil around the tree. When a tree is felled the stump bleeds in a like manner until large masses of gum can be broken off from the stump. This "young" gum is white in color, and has not the rich amber color which age imparts to it when stored beneath the surface of the soil away from the action of sun and weather.

The gum is not soluble in water. It ignites freely and burns with a lively sooty flame. It froths and bubbles, and produces a pleasant aromatic odor. The perfume it exhales when burning in the open air is not unlike that of frankincense and myrrh.

Some of the finer specimens of kauri gum are used in the manufacture of jewelry, but, while it is very clear and beautiful, it is not so desirable for this purpose as amber. It is nothing like as hard as the latter, and is much more brittle, and insects and plants are not so frequently found embedded in it.

Kauri gum was known to the native race long before the islands were settled by Europeans. They used it for the purpose of kindling their fires, and it is also said to have been employed by them in their religious rites, but there does not appear to be any ground for the statement.

Kauri gum became an article of commerce immediately after New Zealand became a British colony. At first the exports were small, amounting to about 100 tons per annum. The price of gum at that time ranged from $24 to $28 per ton. The natives then were the only persons engaged in searching for it and bringing it to market.

The implements used in digging for the gum consist of a spade and a spear. The spear is a long steel rod about half an inch in diameter, with a wooden handle with a cross on the top like that of a spade or a shovel. The rod is brought to a point, and the gum digger pierces it into the ground. Practice and experience enable him to tell whether he is touching a stone or a piece of gum. When he touches the gum he digs around it until it is extricated, and then renews the search as before.

The number of persons regularly engaged in digging gum varies from 1,800 to 3,000, the greater part of whom are Maories, but even they do not show any special fondness for the work. They resort to it when they become pressed for food and clothing on account of the failure of their crops or other causes. Many Europeans have resorted to this kind of work, but they belong generally to a class who are unruly and impatient of the restraints which a civilized life imposes upon them, and who prefer to camp out after the fashion of gypsies, and live in tents and ranpo huts rather than in houses fitted for civilized beings.

It is generally supposed that a European who resorts to gum digging is unfitted for any other occupation. He leads a reckless dare-devil sort of life, away from friends and kindred, and from the restraints of civilization. All the finer feelings of his nature become blunted, and he falls to a lower depth than the savages with whom he makes his home. Among this nomadic class are a number of the degenerated sons of the aristocracy of Great Britain.

When the gum is taken out of the ground it is covered with earth, and its surface is found to be in a partial state of decay. When the digger is tired of work he puts his gum into a bag and carries it to his tent or hut, and in the evening or upon rainy days he, with the assistance of his wife and children, scrapes off the decayed surface until the clear solid gum beneath is reached. When a sufficient quantity of it has been scraped, it is put into a box or bag and taken to the nearest store or public house, where it is sold for what it will bring. Sometimes the purchaser will assort it, but it is not generally sorted till it reaches the city buyer, who employs a large number of skilled hands for that purpose. The gum, after it is scraped and assorted, is packed carefully in boxes, so as to prevent the lumps from breaking. It is then ready for export. The dust and scrapings are also exported.

Some of the gum is used in New Zealand for the manufacture of varnish, but in no great quantity.

The export of kauri gum for the year 1880 will be larger than that of any other year. The total export for 1878 was 3,410 tons, and 3,247 tons was the total export for 1879. The invoices thus far received indicate that the total shipment for the year 1880 will be 5,500 tons.

The price of gum varies, of course, according to quality and the condition of the market. It ranges from $144 to $720 per ton. The greater part of it, however, is bought at the former price. The average price may be safely set down at $216 per ton. At this rate the total value of the estimated shipment for the year 1880, viz., 5,500 tons, would be $1,188,000. More than two-thirds of the gum goes to the United States. It is either shipped to New York and Boston in sailing vessels, or to London for transshipment to the American cities.

It is a matter of regret, adds Mr. Griffin, that the kauri forests are disappearing. The trees are being so rapidly cut down that they will soon cease to exist. The government has not taken any steps to protect them, either by conserving those that remain or by planting new ones. At the present rate of consumption, fifty or eighty years will see the great bulk of the kauri trees cut down. Of course, when the trees are destroyed there can be no deposits, and kauri gum will become a thing of the past.

The amount of gum taken out of the soil up to the present time has been so great, Mr. Griffin concludes, that it would probably require a forest growth of ten thousand years to replace it.

The Depths of the Sea.

Mr. Henry Du Villard recently lectured before the Franklin Society in Providence, R. I., on the "Depths of the Sea," illustrating the same by some fine drawings and specimens of apparatus which had been in use in the deep sea soundings. These were loaned by Captain Bartlett of the United States Coast Survey steamer Blake. The lecture was furthur illustrated by specimens of the marine life taken in the soundings and dredging.

The speaker began by referring to the circumstances which gave him the opportunity of being aboard the Blake, commanded by Captain John R. Bartlett, Jr., for a time last summer, relieving, while there, an officer who was ill. He was enabled, while on board, to collect many interesting facts. The sea covers three-fourths of the surface of the globe. Its saltness is attributable to rivers and springs which are constantly washing into it chloride of sodium and other soluble salts. As evaporation carries more of these salts back, they naturally accumulate. The sea water in arctic regions is less than in the tropics, owing to the melting of icebergs. The color of the sea water when free from all mixtures is a pure deep blue. The color is due to the fact that the blue rays of the spectrum are less liable to be absorbed by masses of transparent substances than the others, thus predominating in the reflected pencil. The red, white, and brown patches in the Pacific and Indian Oceans are owing to the presence of swarms of animalcules, and the colors of the red and the yellow seas to materials of vegetable origin. The phosphorescence of the sea, best seen on a dark night, is due to the presence of innumerable forms of life contained in the water.

The common method of "throwing the lead," by which depths near the shore are approximately ascertained, was here explained. The depth of the ocean was for many years a matter of uncertainty, in consequence of the great difficulties with which investigators had to contend in using a weight and rope for sounding its depths. This line would run out long after the shot had reached the bottom. A sinker of sufficient size to remedy this difficulty could not be hauled back against the pressure of water.

Owing to the imperfections in the methods of sounding, as explained by the speaker, fabulous depths of six or eight miles were reported and no bottom reached. Methods of ascertaining depths by exploding charges of powder in the deep water, and by a record of the compression of air in tubes, were explained and the reasons of their failure given.

It was not until about the year 1854 that Passed Midshipman T. M. Brooke, a clever young officer in the United States Navy, invented an ingenious device for detaching the shot when it reached the bottom. This apparatus was shown both by drawings and by an actual piece ready for use. The simplicity and beauty of this machine greatly pleased the audience. Soundings of two and one-half miles were made by Lieutenant Brooke in the Pacific Ocean, and this corresponds nearly with Professor Bache's estimate of the average depth of the ocean calculated from the movement of the great tidal wave of December 23, 1854. The deepest sounding ever accurately made was by the Challenger, Captain Nares, in the Indian Ocean, where they found 5,000 fathoms, more than five miles. The soundings made for the laying of the first Atlantic cable were explained.

Scientific men had long believed that life at the bottom of the sea was confined to a narrow limit near the land, six hundred feet being about the limit, and that those animals and plants had almost disappeared, these representing only those of the simplest organization, and at the depth of 300 fathoms (1,800 feet), nothing could possibly exist, and that the sea bed was a desert waste. They knew that at a depth of 1,000 fathoms animals must bear a pressure of a ton on a square inch; moreover, that at a depth of 50 fathoms, the sun's light is almost entirely cut off. Further deep soundings brought up shells of dead animals living near the surface, but no living ones.

The progress of explorers by which evidences of life in great depths were found was here given. The first absolute proof that animal life could be sustained at such great depths was from fishing up a cable that would not work, lying between Sardinia and Bona. It was corroded, broken, and covered with marine animals, cemented to it. In 1868, 1869, 1870, H. M. ships Porcupine and Lightning made many hauls of the dredge in the Atlantic, the deepest being twenty-seven miles off the Bay of Biscay, where animal life, including bony fishes, was found in abundance.

The question of what the myriads of animals at these great depths feed upon was considered. Explanations given by scientific men, notably Sir W. Thomson, were quoted, the amount being that these animals take in organic matter, which analyses prove is in sea water everywhere, by absorption, they belonging to the lower orders, which are nourished in that way. It is also probable that they make their shells in a similar way.

In regard to the enormous pressure at great depths, Sir Wyville Thomson estimates the pressure upon a man at a depth of 12,000 feet to be equal to a weight of twenty locomotives, each with a good train loaded with pig iron. But a body supported within and without, through all its tissues, by a comparatively incompressible fluid as water is, would not be necessarily incommoded. We sometimes find, when we get up in the morning, by a rise of an inch in the barometer, half a ton has been piled upon us during the night, but we experience no inconvenience. If, however, we were to go up a high mountain we would move with great difficulty.

The speaker noticed the same effect upon the animals brought to the surface aboard the Blake. Their eyes were blown nearly out by air expanded, and their swimming bladders were forced nearly out of their mouths. The greater part were dead except eels. The work of the Blake in its soundings and dredgings was explained by the speaker, and a book of the records shown. It included the depth of the water and its density at different depths, the bottom and surface temperature, and at two fathoms deep, and in all cases the meteorological and other conditions are carefully noted.

At this point the speaker gave an idea of the most approved sounding machine now in use by the aid of a model taken from the Blake. It is the Sigsbee sounding machine now in use upon the Blake, embodying the original design by Sir Wyville Thomson, with improvements by Lieutenant Commander Sigsbee, United States Navy.

The lecture was listened to with the greatest attention and interest, and after complimentary remarks by the President and Dr. W. O. Brown, upon motion of the latter a vote of thanks was tendered to the lecturer by the Society. After the adjournment the audience gathered around the table to examine the apparatus and specimens.

A New Product from Birch Bark.

A French inventor has patented a method of improving India-rubber and gutta percha by the addition of a distillate of birch bark. By distilling the outer layers of the bark he obtains a dense black gummy matter which possesses the properties of ordinary gutta percha with the additional

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quality of resisting both the action of air and the strongest corrosive acids. He claims also that by adding a small proportion of the birch bark gum to gutta percha or to India-rubber (one-twentieth part will suffice), the durability of the rubber or the gutta-percha will be greatly increased, the new mixture not being acted upon by the air or by acids.

The Destruction of Trichinæ.

It is commonly believed that ordinary cooking will destroy trichinæ and render infested meat innocuous. Without doubt, as has been stated in the daily press, "the encapsuled parasites cannot survive a certain elevation of temperature, and death renders them harmless." Is it, however, correct to say that a "complete means of protection is furnished by the heat incidental to cookery?" Considerable doubt is thrown on this statement by M. Vacher, of Paris, whose authority is of considerable weight. He affirms that the protection given by cooking is quite illusory, and that in the thorough cooking of an ordinary joint of meat the temperature in the center is not sufficient to insure the destruction of the parasite. He took a leg of pork of moderate size and boiled it thoroughly. A thermometer placed within it at a depth of two inches and a half registered, after half an hour's boiling, 86° Fah., after boiling for an hour 118°, after an hour and a half 149°, and after two hours and a half, when the joint was thoroughly cooked, 165°. This temperature M. Vacher maintains is insufficient, and we must remember that at the center, which is still further from the surface than the bulb of the thermometer was placed, the temperature would not be so high. "Trichinæ would escape almost entirely the action of boiling water" in cooking. M. Vacher's note was communicated to the Chamber of Deputies, and, no doubt, has influenced the decision of the French Government to prohibit entirely the importation of American pork.—*Lancet.*

Raw Oysters.

Dr. William Roberts, in an interesting series of lectures on digestive ferments, published in the *Lancet*, says: The practice of cooking is not equally necessary in regard to all articles of food. There are important differences in this respect, and it is interesting to note how correctly the experience of mankind has guided them in this matter. The articles of food which we still use in the uncooked state are comparatively few, and it is not difficult in each case to indicate the reason of the exemption. Fruits, which we consume largely in the raw state, owe their dietetic value chiefly to the sugar which they contain; but sugar is not altered by cooking. Milk is consumed by us both cooked and uncooked, indifferently, and experiment justifies this indifference; for I have found on trial that the digestion of milk by pancreatic extract was not appreciably hastened by previously boiling the milk. Our practice in regard to the oyster is quite exceptional, and furnishes a striking example of the general correctness of the popular judgment on dietetic questions. The oyster is almost the only animal substance which we eat habitually, and by preference, in the raw or uncooked state, and it is interesting to know that there is a sound physiological reason at the bottom of this preference. The fawn-colored mass which constitutes the dainty part of the oyster is its liver, and this is little else than a heap of glycogen. Associated with the glycogen, but withheld from actual contact with it during life, is its appropriative digestive ferment—the hepatic diastase. The mere crushing of the dainty between the teeth brings these two bodies together, and the glycogen is at once digested, without other help, by its own diastase. The oyster in the uncooked state, or merely warmed, is, in fact, self-digestive. But the advantage of this provision is wholly lost by cooking, for the heat employed immediately destroys the associated ferment, and a cooked oyster has to be digested, like any other food, by the eater's own digestive powers.

Medical Uses of Figs.

Prof. Bouchut mentions some experiments he has made, going to show that the milky juice of the fig tree possesses a digestive power. He also observed that when some of this preparation was mixed with animal tissue, it preserved it from decay for a long time. The *Medical Press* refers to this fact, in connection with Prof. Billroth's case of cancer of the breast, which was so excessively foul smelling that all his deodorizers failed, but on applying a poultice made of dried figs cooked in milk, the previously unbearable odor was entirely done away with. Certainly the remedy is worth trying.

Foot-and-Mouth Disease.

A serious invasion of eczema epizootica, or foot-and-mouth disease, has taken place, after the country had been free from it for several months. The infection is supposed to have been conveyed by diseased cattle from the North of France, which arrived at Deptford Market some time ago. Thence it was carried in every direction, the fairs and markets being the chief sources of dissemination. It now prevails pretty generally over England, notwithstanding the efforts made to check its progress. It is to be feared that inspection of the cattle markets is often at fault. For the chief metropolitan market there is only one inspector, and as the number of animals crowded together is frequently more than two thousand, it is evident that they cannot be submitted to that careful examination which is so necessary for the detection of the disorder, particularly at its commencement, or in its milder form. The infection can be conveyed by all kinds of media independent of the living animal, and this certainly renders the extension of the disorder far more easy, and its suppression much more difficult, than some other transmissible diseases of animals. It must not be forgotten that the infection can be transmitted to other than the bovine species, and man himself is not proof against it. The milk is the chief vehicle of infection.—*Lancet.*

NOVEL FISH BASKET.

One of the most ingenious and useful inventions for the comfort and convenience of fishermen that we have seen for

FISH BASKET.

a long while is a canvas basket or creel, made by Messrs. Abbey & Imbrie, of this city. They are made of waterproof canvas, with the sides and bottom perforated for the purpose of draining the basket and for ventilation. As they roll up in a small package when not in use, or to fit in a valise when traveling, their great superiority over the old-fashioned fish basket can readily be seen.

The accompanying illustrations show the basket ready for use and folded for traveling, and are sufficiently plain to be understood without further description.

FISH BASKET FOLDED.

Good Work by Boys.

The good example set in Maine last year and year before, of offering prizes for farm work by boys, has been wisely followed in Vermont. The prizes won last year have just been awarded. The first prize of $25 and a scholarship in the Vermont University and State Agricultural College (worth $50 a year for four years) for corn, was taken by Frank J. Hubbard, of Whiting, and the first prize, of the same amount, for potatoes, by Lewis S. Breed, of Goshen. The second prize, of $20, for corn, was taken by Edgar J. Tuthill, of Newfane, and for potatoes by Frank J. Hubbard. The third prize, of $15, for corn, was taken by J. T. Goodenow, of Montpelier, and for potatoes by Burt Royce, of Williamstown. The fourth and fifth prizes for corn were taken by Edward N. Casey, of Whiting, and H. E. Thayer, of Guilford; and for potatoes by Eugene Plastridge, of Northfield, and George R. Powers, of Lunenburg. No less than 305 boys competed from 146 different towns. The best yield reached was at the rate of 192 bushels of dry shelled corn to the acre and 422 bushels of potatoes to the acre. As the average production of Vermont farms is estimated to be 39 bushels of corn and 140 of potatoes to the acre, it will be seen that the results secured by the boys are quite encouraging.

Opening of a New Railway to the Pacific.

A new route to the Pacific is opened by the completion of the Atchison, Topeka and Santa Fe Railroad to a connection with the Southern Pacific at Deming. From Kansas City to Deming the distance (over the Atchison, Topeka and Santa Fe) is 1,154 miles; from Deming to San Francisco (over the Southern Pacific and Central Pacific), 1,208 miles, making the distance from Kansas City to San Francisco 2,362 miles, against 1,916 from Omaha to San Francisco. From Chicago the distance is about the same to Kansas City (or Atchison) as to Omaha; but from New York the distance to Kansas City by the shortest route is 1,342 miles, and to Omaha 1,402 miles. Thus the new route is considerably the longest in distance; but as trains run quite slowly by the northern route, it will not be difficult (though somewhat costly) to make as good time by the new route as is made now by the Union Pacific. At the rate trains run on the Union Pacific the additional length of the Southern route will require nearly twenty-four hours' time, but as the average speed on the old line is but 19 miles per hour, this can be made up by running trains on the new line about 23½ miles an hour. The new line is likely to get a fair share of the through traffic, from this direction at least; in the other it will depend chiefly upon the disposition of the Central Pacific, which works both roads and may prefer to send traffic by the route which will give it the largest profits. Passengers, especially those who expect to make the trip but once, are very likely to take one route in one direction and the other in returning, thus seeing as much as possible. A good deal has been claimed for the new route on account of its freedom from snow blockades; but we doubt if the possibility of a snow blockade on the Union Pacific will drive from it in winter as many passengers as the certainty of the infernal heat on the Southern Pacific in Arizona and the California desert will deter from attempting that route in the summer. But no doubt the new route will get a good share of the through passengers, and the loss of them will be quite seriously felt on the old line, the rates being high and yielding a good profit. The competition of the new route, however, will not be nearly so serious a matter as it would have been a few years ago, when the local traffic was comparatively trifling.

The country that is likely to profit most by the new line is the mining region of Arizona, which heretofore has had to get its supplies from the Atlantic coast by shipping them 3,300 miles west to San Francisco, and then 1,000 or 1,100 miles southeast. However, rates on this traffic are not likely to be low now. These scattered mines are about all there is to give local traffic on some 700 miles of road.

Rates, it is understood, will be the same by the new route as they have been by the old one. The Central Pacific, working both lines on the west, is in position to control this, and it is not likely to consent to anything which will reduce its profits.—*Railroad Gazette.*

A Luminous Liquid.

It is well known that certain metallic salts, especially if previously heated, when exposed to direct sunlight, to the electric or the magnesium light, and then brought into a dark place, give off a yellow or a bluish-white light. Especially the sulphurets of magnesium, strontium, and calcium possess this property in a greater or less degree. Balmein has recently patented a mixture which possesses this property in a remarkable extent. Thus, if the dial plates of watches are coated with this composition and then with a colorless varnish, the figures may be seen in the dark at some distance, if they have been previously exposed to diffused daylight. According to my experiments the organic compounds of these metals possess the same property, especially rosin oil lime soaps. If 100 parts of rosin oil are boiled in a suitable pan with 30 parts of freshly slaked lime, raising the heat by degrees, the mass which is at first lumpy becomes tougher, and finally passes into a thin liquid. As soon as this stage is reached, say at 320° Fah., the entire surface of the liquid becomes luminous in the dark, which is still more intense at a greater heat. At 380° Fah. the bluish-white light is very strong in the dark. Objects dipped in the liquid remain luminous for some time.—*B. Hoffmann, in Chemiker Zeitung.*

Laundry Machinery in China.

Our esteemed antipodal contemporary, the Foochow *Herald*, under date of January 27, 1881, says that plans and specifications for a model laundry have arrived there from England—a complete steam laundry, such as in England purify the shirts of the nobility, and, mayhap, royalty itself. The *Herald* is immensely tickled over it, and sets the details of the machine before its readers with great relish, and indorses the scheme with unction—heedless of the advertisement involved. It says that the "plant" to be adopted will have the capacity of turning out 12,000 articles per week, and be worked by a four horse power engine with all the appurtenances. The *Herald* hopes and believes that the new laundry will be the forerunner of other steam laundries which will soon "eclipse that continual pest, the washman, and all his tribe." It is a curious fact, suggests the *Daily Graphic*, that just as we are beginning to welcome Chinese washmen in this country as ideals of care and skill in their line, and desirable substitutes for the ripping and reckless washerwomen, China itself should be hailing steam laundries as a deliverance from what we are learning to regard as one of the mercies of Providence. But so it is. The world revolves as of old, and light ever comes from the East.

Intestinal Bacteria.

Nothnagel, of Jena, has been investigating the organisms found in fæces, and has examined the microscopical characters of five hundred stools in health and disease. He found many microscopic organisms constantly present, but that which was found in greatest abundance was the *Clostridium butyricum* of Prazmowski (the *butyric vibrio* of Pasteur, the *Bacillus amylobacter* of Van Tieghem). It occurred in the fæces in which no starch could be demonstrated. It is probably this which has given rise to the statement that the yeast fungus is often present in the fæces; in point of fact it is very rarely found in the fæces. Riesenfeld and Brieger discovered butyric acid in both the intestinal contents and in stools, and the product is doubtless the result of the growth of these bacteria.

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