September 12 to 17, 1932, under the presidency of Professor G. Grijns. The main subjects to be discussed at the general session of the congress are: (1) Avitaminoses with special reference to beri-beri, (2) yellow fever and 2b leptospiroses, (3) helminths with special reference to hookworms, and (4) malaria with special reference to blackwater fever. Special speakers have been invited for each of the above subjects. In addition to the general meeting, section meetings will be held at which there will be an opportunity to discuss other subjects. Persons desiring to participate in the congress should notify the general secretary, Professor E. P. Snijders, Institute of Tropical Hygiene, Amsterdam, Holland, not later than December 31, 1931. The subscription fee is one pound sterling (12 Dutch guilders), payable at the Nederlandsche Bank, Amsterdam.

ACCORDING to *Industrial and Engineering Chemistry,* the van't Hoff Fund, founded to endow investigators in the field of pure and applied chemistry, has available for 1932 approximately 1200 Dutch guilders. Applications must be sent by registered mail to Het Bestuur der Koninklijke Akademie van Wetenschappen, bestemd voor de Commissie van het "van't Hoff-Fonds," Trippenhuis, Kloveniersburgwal, Amsterdam, Holland, and must be received before November 1, 1931. Applicants should give a detailed account of the proposed use of the grant and of the reasons upon which the claim is based. Copies of papers resulting from the work must be sent to the committee, but may be published in any journal, with a note to the effect that the work was supported by a grant from the van't Hoff Fund.

BEFORE attending the meeting of the American Public Health Association in Montreal, Canada, an official delegation of physicians, representing the Association of Medical Officers of Health of Great Britain, is making a study of federal, state and municipal health organization and administration in the United States.

THE trustees of the University of the Philippines have closed the college of dentistry "because disputes had destroyed the usefulness and efficiency of the college."

RITTER HALL, the new $120,000 laboratory at the Scripps Institution of Oceanography, opened about September 1. The new building will make available an additional 14,000 square feet of laboratory space, which will augment the laboratory space in the library building and in the George H. Scripps laboratory building. The new laboratory occupies a ground space of 46 by 100 feet and is three stories in height. The first floor contains laboratories equipped with tanks for salt-water fish, a laboratory for photographic purposes, a twelve-unit refrigeration department, in which salt brine is maintained at an even temperature, a transformer vault, boiler rooms, a carpenter shop and workrooms.

A SERIES of illustrated lectures will be delivered in the lecture hall of the Museum Building of the New York Botanical Garden at 3:30 as follows: September 5, "Microscopic Projection of Plant Sections," Professor W. J. Bonisteel, professor of botany and pharmacognosy at Fordham University; September 12, "Flowers in Late Summer Gardens," Mr. Kenneth R. Boynton, head gardener; September 19, "The Gardens of the World," Colonel E. A. Havers; September 26, "Color Photography in the Garden," Mrs. Jerome W. Coombs, of Scarsdale; October 3, "Dahlias," Dr. Marshall A. Howe, assistant director; October 10, "Plant Distribution in Malaya," Dr. Elmer D. Merrill, director-in-chief; October 17, "Autumn Coloration," Dr. A. B. Stout, director of laboratories; October 24, "Botanical Activities in the United States," Dr. John Hendley Barnhart, bibliographer; October 31, "The Ancestral History of Some Living Plants," Dr. Arthur Hollick, paleobotanist; November 7, "Autumn in the Garden," Mrs. Wheeler H. Peckham, honorary curator, iris and narcissus collections; November 14, "Some Edible and Poisonous Mushrooms from Maine," Professor H. Beaman Douglass; November 21, "A Botanist's Rambles through the West Indies," Mr. Robert Hagelstein, honorary curator; November 28, "A Winter in Bermuda," Dr. Fred J. Seaver, curator.

DISCUSSION

SUBMERGED PEAT BEDS AMONG THE APOSTLE ISLANDS

IN SCIENCE for February 13, 1931, Dr. L. R. Wilson, of the University of Wisconsin, discusses evidences which seem to show a recent lower lake level in the western part of the Lake Superior basin. The evidences consist of peat and overlying sand that was dredged from the bottom of the lake at two localities among the Apostle Islands. It is stated that the peat was brought up from a depth of 54 feet and was covered by about 14 feet of lake sand. It is stated, further, that upon analysis the peat was found to be very fresh and that the sand shows characteristics which indicate that it was deposited since the retreat of the last ice-sheet. Dr. Wilson ventures the opinion that the occurrence of this peat in the situation described "is not in accordance with our present ideas concerning the post-glacial history of the region." I would like to point out that, instead of being out of accord with our present ideas, the submerged peat

beds among the Apostle Islands appear to constitute by far the best evidence yet found in support of our present interpretation of the lake history.

Dr. Wilson gives a reference to Dr. Frank Leverett's recent report on the "Moraines and Shore Lines of the Lake Superior Region" (U. S. Geological Survey, Professional Paper 154-A, 1929). In this paper, Dr. Leverett makes the statement that after the outlet of the Nipissing Great Lakes had become established at North Bay, Ontario, ". . . the differential uplift raised the outlet at North Bay so high that the lake waters were brought up to the St. Clair outlet at Port Huron. By this rise any shore work done by the Nipissing Great Lakes south of the isobase that runs through the North Bay outlet would have been submerged and to a large degree obliterated. The original Nipissing beach is to be seen, if anywhere, only in the extreme northeastern part of the Lake Superior basin. The visible Nipissing beach is therefore, in the main, the product of the shore work after this rise, at a time when both the North Bay and the St. Clair outlets were in use" (page 70).

Thus, the *original* Nipissing beach marks the first stage of the Nipissing Great Lakes, and the *visible* beach (commonly called simply "the Nipissing beach") marks the second stage. The first stage had one outlet, and that was at North Bay, Ontario; the second had two outlets, for the gradual elevation of the land in the north backed the water up toward the south and finally caused an overflow into the St. Clair River at Port Huron, Michigan. Continued uplift finally diverted the whole discharge from North Bay to Port Huron, ending the Nipissing Great Lakes and inaugurating the present or post-Nipissing lakes.

The Nipissing beach at North Bay has an altitude of 698 feet above sea-level. Studies along the north shore of Lake Superior by A. C. Lawson in 1892 and by the writer in 1895 furnished data for drawing the isobase of the North Bay outlet. It runs west-northwest (about N. 68° W) from North Bay and passes close to Mazokama on the north side of Nipigon Bay. This isobase cuts off about 50 miles of the present shore of Lake Superior in its extreme northeastern part, and it is only in this stretch north of the isobase that the first or original Nipissing beach can now be seen. Everywhere south of the isobase, the original Nipissing beach is submerged, and the visible shore line in that area is in reality the beach of the later, two-outlet stage. Thus, southward from the isobase the plane of the original Nipissing beach passes more and more deeply under the plane of the later or two-outlet stage. This relation of the two lake stages and of the beaches which represent them was well established in 1895, but the amount of submergence at any given place south of the isobase has remained unknown for lack of clearly defined evidence. The submerged peat bed of the Apostle Islands appears to supply the first reliable evidence bearing on the depth of submergence of the original Nipissing beach.[1]

Knowing the characteristics of peat and the normal conditions of its growth, we seem justified in believing, tentatively, that the peat described by Dr. Wilson was formed at or very near to the level of the Nipissing Great Lakes during their first or one-outlet stage. Peat is formed mainly in clear, quiet waters free from notable disturbance and from all sedimentation, whether by wave action and shore currents or by streams. It is, of course, conceivable that the peat in question was formed in a bog, in a drainless basin on a post-glacial land-surface, but it seems much more probable that it was formed in a lagoon close to the lake shore of that time, protected from wave-and-current sedimentation by a bar between it and the lake, and at the same time receiving no stream-borne sediment from the adjacent land. From these considerations it seems probable that the submerged peat west of Sand Island lay very close to the lake level of that time, probably within a foot of it or less.

Dr. Leverett found that the plane of the two-outlet stage intersects the present lake surface about on a line running west-northwest from Washburn, Wisconsin, and meeting the north shore near Knife River, 20 miles northeast of Duluth. From this line the imaginary plane of the two-outlet stage rises toward the north-northeast about six inches per mile to the isobase of North Bay. Dr. Wilson states that the peat locality is about one and one half miles west of Sand Island, which would place it about 15 miles northeast of the isobase of Washburn. The plane of the two-outlet stage passes, therefore, over the peat locality about seven or eight feet above the present lake surface, or something like 62 or 63 feet above the peat, thus affording a tentative measure of the interval between the plane of the original Nipissing beach and the plane of the two-outlet beach at that particular place.

If a line parallel to the isobase of North Bay be drawn through the peat locality and produced toward the southeast it passes over the northern part of Lake Michigan and the southern part of Lake Huron. These lakes are both 20 feet lower than Lake Superior, so that, if we assume, tentatively, that the submerged plane of the original Nipissing beach passes uniformly through all three of the lake basins, this beach should be found at a depth of about 34 feet in the basins of Lakes Michigan and Huron on the

[1] The history of the Nipissing Great Lakes and the relations of their beaches and outlets are discussed in U. S. Geological Survey, Monograph 53, Chapt. XXII, especially pages 456–7, 1915.

isobase of Dr. Wilson's peat locality in the Apostle Islands.

In the Lake Huron basin the isobase of the peat locality produced from Lake Superior passes roughly 40 miles north of the zero or hinge-line of the northern uplift. At and south of this line there appears to have been little or no uplifting of the land since the beginning of the Nipissing Great Lakes, so that in this interval, or more probably in the southern part of it, the uplift died out, and the plane of the original Nipissing beach meets the subaqueous slope or, if the depth of the basin permits, becomes horizontal at the hinge line and continues southward in that attitude. The depth of the submerged horizontal stretch is not now known, but seems likely to be near 40 or 45 feet.

In the Professional Paper referred to above (pages 71–2), Dr. Leverett refers to G. R. Stuntz's finding of submerged tree stumps in place at the mouth of St. Louis River west of Duluth. In the area southwest of the Washburn isobase, the plane of the beach of the two-outlet stage passes below present lake level. The drowning is probably 12 to 15 feet at the river's mouth. Since the slow uplift turned the narrow strait at Sault Ste. Marie into a river, the level of Lake Superior has been controlled by that barrier. Its isobase, parallel with that of the North Bay outlet, strikes the north shore near Grand Portage Bay, Minnesota. In the whole area south of this line the shores of the lake are now undergoing progressive drowning. If the submerged peat west of Sand Island lies close to the level of the original Nipissing beach this fact affords a more accurate basis for the study of many interesting problems relating to the history of the Nipissing Great Lakes. The occurrence of the submerged peat in the Apostle Islands is decidedly in accord with our present knowledge of the post-glacial history of the region.

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NORTH AMERICAN PHYLLOPODS

IN SCIENCE, February 27, 1931, Mr. C. H. Behre, Jr., has presented some interesting questions concerning the zoogeography, ecology, and natural history of *Branchinecta*. His paper has prompted the following notes and discussion.

The occurrence of *Branchinecta coloradensis* at high altitudes is not necessarily an index of relationship. If the species in question had resulted from isolation since the glacial epoch, it should be related morphologically to the species *B. paludosa* of the arctic. The genus *Branchinecta* has representative members in Brazil, Patagonia, Russia, Hungary, Australia, Asia Minor, Mongolia, Tibet, United States and the circumpolar regions of the north and south. In all, about thirteen species are now known, five of which occur in North America. The relationships of the various species have not been adequately considered. However, there is no more reason to believe *B. coloradensis* morphologically related to *B. paludosa* of the arctic than *B. granulosa* from Patagonia, *B. packardi* from Colorado, or *B. ferox* of Russia, Hungary and Asia Minor.

In a recent paper[1] I have shown the distribution of the two continental species of *Streptocephalus*. Since that time I have collected *S. sealii* in small pools in the jungle between Jalapa and Vera Cruz in the state of Vera Cruz, Mexico. *S. sealii* is now known northward as far as Medicine Hat, Alberta and southward to the *tierra caliente* of Vera Cruz, Mexico. The ranges of the two continental species overlap on the central plateau, but the remarkable thing ecologically is, that, as yet, the two species have not been taken together in the same pool.

Thamnocephalus platyurus, Streptocephalus texanus, and *Apus aequalis,* were taken near Cerritos, San Luis Potosi, Mexico, in a roadside pond on June 2, 1930. *Leptestheria compleximanus* was obtained on May 14, 1930, in pools of the Lago de Texoco in the Federal District, Mexico. A species of *Apus* found in the same region is, according to the peons, used as food during the occurrence of the phyllopod in the winter months.

Concerning the question raised by Mr. Behre of the method of establishment of a phyllopod fauna, it should be noted that probably all phyllopod eggs can withstand desiccation. Many possibilities exist for transportation of eggs. Wading birds, turtles, mammals including man, are possible transporters. We do not know, as yet, whether or not the eggs of phyllopods are viable after passing through the intestinal tract of vertebrate animals Many species of entomostraca have been reared from mud obtained by travelers in foreign lands. G. O. Sars has written several papers on entomostraca obtained in this manner.[2] This suggests the means by which ponds may become stocked with fairy shrimp and other entomostraca.

My observations with *Eubranchipus vernalis* lead me to believe that death normally occurs shortly after breeding. The males die first, and this is the probable explanation of the statement so often found in the literature on various species of Phyllopoda: the male of this species is unknown. A resting period of unknown length is necessary before the eggs can hatch. Thereafter the appearance of the fairy shrimps is

[1] E. P. Creaser, Occ. Pap. Mus. Zool. Univ. Mich., No. 217, 1930.

[2] G. O. Sars, *Skr. Vidensk. Christiania,* 95, 8, 1–56. *Arch. Naturv.,* 18, No. 2, 1–17. *Ibid,* No. 3, 1–81.