services will be preceded by an academic procession of trustees, guests and faculty. At the afternoon session, following a luncheon given to the visiting engineers, a conference on engineering problems will be held. The ceremonies will close with a dinner and evening session.

GRANTS recently made by the Rockefeller Foundation include a grant of not more than £1,200 a year for five years from January 1 for research in cellular physiology at the Molteno Institute of Parasitology of the University of Cambridge, under the direction of Dr. David Keilin, Magdalene College, Quick professor of biology; $2,000 to the Medical School of the University of Oregon, for research on the physiology of the brain by Dr. William F. Allen and Dr. Olof Larsell, professors of anatomy; $1,000 to Union College to provide apparatus, animals and chemicals for the use of Dr. Samuel L. Leonard, assistant professor of biology, for his researches in endocrinology.

THE University of Hamburg is henceforth to be known as the Hansa University.

PROFESSOR HANS MEYER, the editor of *Strahlentherapie,* Park Allee 73, Bremen, on the occasion of the fortieth anniversary of the discovery of Roentgen rays, has issued an appeal to radiologists of all nations for portraits and short biographies of medical men, physicists, nurses and others who have lost their lives as the result of x-ray work.

THE trustees of Lake Forest College will award a cash prize of $15,000 for the best book or manuscript, heretofore unpublished, on the connection, relation and mutual bearing of the humanities, the social sciences, the physical sciences, the biological sciences, or any branch of knowledge, with and upon the Christian religion. The award will be made under the Bross Foundation, established in 1857, after decision by a committee of judges, on or after January 1, 1940.

THE Dutch Genetic Association has offered a prize of 250 gulden for an essay on the inheritance of differences in resistance to disease in men and animals. The essay must contain a review of the literature, especially as regards diseases of the blood, with personal observations and conclusions. The essay should be sent to the secretary of the society, Dr. A. L. Hagedorn, Soesterberg, Holland, before a date to be announced later.

DISCUSSION

SOME ZOOGEOGRAPHICAL PROBLEMS OF THE NORTHERN PACIFIC

THE northernmost parts of the Pacific Ocean have been little studied by marine zoologists, and many zoogeographic problems there have escaped the attention of scientists. This is not only due to a lack of work in the area, but also depends on the tendency among the older zoologists to describe most specimens from such "remote places" as "new species" after superficial examination. The literature is thus encumbered with a considerable number of Pacific species which are either so scantily described that they can not be reidentified, or can not be separated from Atlantic species by existing figures and descriptions.

Every zoogeographical study must be based on an exact and detailed knowledge of species and even of the smallest varieties, as in ecology, a useless study without such information. This also applies to causal zoogeography. In many cases small and insignificant characters such as those used in classification (taxonomy) by geneticists in their heredity studies should be used.[1]

The general zoogeographical studies of the Pacific coastal waters of North and Central America have, contrary to earlier expectations, revealed remarkable differences there from the fauna of Eastern Asiatic waters. On the other hand, there is an obvious relationship between the Atlantic littoral fauna of Central America and the (much richer) one of the Indo-Malayan Archipelago. Sven Ekman has recently described in detail[2] the recent evidence of these relationships. Ekman reviews the fate of the Thetys Ocean and the ecological factors determining the spread of littoral animals. The data suggest that the great abyss of the Pacific Ocean between the Paumotu Islands and the western coast of America was an effective barrier to the littoral fauna at the time of the Thetys Ocean and has remained so ever since, causing the gap in the tropical littoral fauna on the two sides of the Pacific. The comparative poverty on the American side of the Atlantic as compared with the Indo-Malayan region does not prove the Atlantic fauna to be younger. The relationship between the two faunas are features in common derived from the Thetys fauna, and the scarcity on the Atlantic side is due to a period of low temperature in Miocene and Pliocene times. The problems thus brought up by Ekman make it desirable to study the littoral fauna of the northern Pacific. While the Asiatic waters especially in the vicinity of Japan and from there to Bering Straits—an area

[1] Comp. V. Brehm, "Ueber die tiergeographische Valenz der Speziesmerkmale," Zoogeographica, Bd. 1, Jena, 1932.

[2] "Indo-Westpazifik und Atlanto-Ostpazifik, eine tiergeographische Studie," Zoogeographica, Bd. 2, Jena, 1934.

recently investigated by the Russians—are well known, the waters on the American side have scarcely been studied, although this region is one of especial interest.

In the northern parts of the Pacific, there are some species which are also known from the North Atlantic. As many of these "boreal" species can not pass through warmer waters, they must have crossed the Polar Sea by a passage now barred to many of them by the low temperatures of the Arctic Sea. There may be other barriers, as pointed out by E. Gurjanova.[3] She also discusses the various routes of dispersal of Arctic species from their centers of origin in the Polar Sea, the northern Atlantic or Pacific Oceans. This is also discussed by Leo S. Berg.[4] From studies of the Molluscan fauna and particularly from the work of W. H. Dall, he concludes that the boreal and subarctic fauna in the upper Tertiary had favorable conditions for development in the northern Pacific. In the Miocene and Pliocene this fauna apparently prevailed throughout the ocean which at that time stretched from the Kamtchatkan region to the northern Atlantic. In post-glacial times, an exchange between the northern Pacific and Atlantic boreal territories through the Arctic Sea was possible during the higher temperatures of the Ancylus and Littorina periods.

My investigation of the Russian collections of Octocorals from the northern Pacific ("Oktokorallen des nördlichsten Pazifischen Ozeans und ihre Beziehungen zur atlantischen Fauna") corroborates Berg's conclusions. A study of the oceanographic features of the Arctic Sea makes it probable that species like the Octocorallians *Paragorgia arborea, Primnoa resedaeformis* and *Pavonaria finmarchica* can not have originated in the Atlantic, but must have invaded the northern Atlantic through the Arctic Sea when the temperature was somewhat higher than at present, and when the entrance to the Arctic Sea from the Pacific was deeper than it is now, *i.e.,* probably at times when great parts of Alaska were submerged. It must be assumed that the ocean currents, especially those of the Arctic, were essentially the same as they now are.

At present, the Atlantic and Pacific stocks of many boreal (northern, but not arctic) species are effectively isolated from one another. This is due to the low temperatures of the Arctic Ocean (especially from the New Siberian Islands to the northern Alaskan region) which, combined with the current flowing thence northward, entirely block the eastern passage against Atlantic intruders north of the New Siberian Islands. Furthermore, the boreal species living in the deeper strata can not penetrate through the shallow waters of Bering Strait.

It is a fundamental assumption of glacial geologists that a species always has the same environmental needs, regardless of age and habitats. This axiom may be doubted without definite proof. (1) Are the demands of a morphologically constant species unchanged during the ages and under various environmental conditions so that it can not stand changes in temperature, salinity, etc.? (2) If a stenovalent species can adapt itself to changed conditions, is this adaptation necessarily combined with changes in its morphologic features?

There are examples among terrestrial animals that changes of conditions brought about by experiments may in certain species change their ecology.[5] But among marine animals, there is no evidence of this in the literature. One might mention results of aquarium experiments. These are, however, of problematic value, for they never actually simulate natural conditions. Indeed, it is curious how uncritical many "experimental biologists" are in applying their work to conditions in nature.

The observations of Fridthjof Økland[6] shows the need of caution. Experiments of Beaudeant (1816) in which he gradually accustomed *Purpura lapillus* and *Patella vulgata* to entirely fresh water, suggested that these species might also become accustomed to fresh water in nature, making them valueless as a geologic index. Yet, in nature *Purpura* lived in summer only where the salinity was not lower than 20 to 25 parts per mille, whereas *Patella* evidently had a lower limit of 15 to 20 parts per mille. Økland's observations (as those of Beaudeant) are only for adult specimens and the halitaxis during the time of propagation as well as that of the larval stages should also be studied, since these are often at variance with the adults. It is a fault of work such as Beaudeant's that morphologic changes have not also been studied, although these may be of a kind and degree that are scarcely discernible.

The study of boreal Octocorals from the northern Pacific seems to suggest a possible way to elucidate these questions. In *Paragorgia* not the slightest difference seems to be present in specimens from the Atlantic and Pacific. In *Primnoa,* on the other hand, while the habitat is similar in places in the two oceans, it on the whole differs markedly. In this case, there is a tendency toward divergent variation in the two geographically separated groups. It is not possible to learn whether this variation is correlated with a change of ecological conditions (*i.e.,* whether the limit-

[3] "Zur Zoogeographie der Crustacea Malacostraca des Arktischen Gebietes," Zoogeographica, Bd. 2, Jena, 1935.

[4] "Ueber die amphiboreale (diskontinuierliche) Verbreitung der Meeresfauna in der nördlichen Hemisphäre," Zoogeographica, Bd. 2, Jena, 1934.

[5] Comp. Hans Krieg, "Kulturfolgende Tiere in Südamerika," Zoogeographica, Bd. 1, Jena, 1933.

[6] "Litoralstudien an der Skagerakküste Norwegens," Zoogeographica, Bd. 1, Jena, 1933.

ing environmental conditions are the same for the two oceans). It would also be interesting to learn whether *Paragorgia* lives under identical hydrographic conditions in the Atlantic and Pacific, since it is morphologically identical in the two habitats.

It is evident from recent investigations that the so-called boreal elements of the Atlantic are also represented in the northernmost Pacific by many species. Of course, endemic Pacific species will also be found, when the boreal region of the Pacific has been thoroughly investigated, but at present investigations especially along the American coast of the Pacific are insufficient. The limit of the boreal region in these waters is uncertain, though there is some evidence to suggest as a working hypothesis that its southern limit is near Puget Sound.

As far as we may judge from the scanty data at hand, the fauna of the Pacific waters along the northern part of the United States, the Canadian coast, Alaska and the Aleutian Islands exhibits a great similarity to that of the boreal Atlantic and boreo-Arctic regions, and this similarity opens up a large and valuable field of investigation for comparative zoology and ecology.

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DEATH OF THE OLDEST CHIMPANZEE IN CAPTIVITY

ON May 14, 1931, the Philadelphia Zoological Garden received a thirty-five-year-old male chimpanzee, "Jimmy," who claimed distinction of being the oldest of his species in captivity and of being the father of the first chimpanzee born in captivity (Anumá). Old "Jimmy" came with a reputation of being a "tough customer," up to which he lived for some time; then gradually he became quite manageable, and during the last months of his life he was gentle and friendly.

"Jimmy" for many years was a member of the primate colony of Mme. Rosalia Abreu, Havana, Cuba. After Mme. Abreu's death, in accordance with her will, he became the possession of the Philadelphia Zoological Garden, with the provision that upon his death his cadaver should be put at the disposal of Yale University.

Up to September, 1935, there are no notes on "Jimmy" at all; since then some records were kept, but these were inadequate because the present observer had under his care about a hundred animals with their diet, housing, mating and the like problems as well as a good deal of administrative work and was not able to give as much attention to "Jimmy" as he deserved. When observed in September "Jimmy" was not the animal known in the literature. He was not a morose, unmanageable old male, with ugly disposition and outbursts of violent activity, but a quiet, obedient, rather slow in movement senile chimpanzee with small and apparently weak muscles, wrinkled skin, poor pelage, sprinkled with white hair and bald patches. His appetite and digestion were remarkably good; he never failed to consume whatever food was given him, and his feces were always well formed. In October "Jimmy" occasionally left one or another article of food uneaten. Early in November his appetite failed more regularly and his digestion appeared to be faulty. His diet was modified, and in a few days "Jimmy" was as good as before. On November 15 the record says: "Very brisk this morning, swings and jumps." But soon he began to decline rapidly, his appetite, fairly good one day, was absolutely absent the next; he became inactive, would build a huge hay nest in the middle of the cage and rest on it most of the day. November 25 was the last day when "Jimmy" had a hearty meal; on the 26th he did not eat; on the 27th he vomited the food he had eaten on the 25th and, although the food was in his stomach for about 36 hours, almost every bit of it was easily identifiable at a glance. His feces during those days were soft but formed, and were whitish, due probably to increased intake of milk. On the 27th of all the foods given him, "Jimmy" took only half an orange, which he sucked dry, but did not attempt to chew. Milk was refused, but a good quantity of water was taken. Most of the day on November 27 "Jimmy" was lying in his hay nest on the floor in the middle of the cage. Only seldom did he get up and walk and then in the unsteady manner characteristic of the last few weeks. In the late afternoon he transferred some hay on the sleeping platform, carefully made up a nice, small round nest, and retired to it. At 7:00 A.M., on November 28, "Jimmy" was found dead on his big hay nest in the middle of the cage. He was lying on his left side; legs stretched and crossed; left arm flung out; right, almost parallel to the body; the right hand gripping some hay; eyes closed; teeth clinched; lips open, exposing the teeth.

Unfortunately our laboratory of pathology was denied the privilege even of cursory autopsy and therefore we are unable to say definitely what was the cause of "Jimmy's" death, except to surmise that it was "old age." The cadaver is now in possession of Dr. R. M. Yerkes, the director of the Psycho-Biological Department of Yale University, from whom we hope to learn the result of autopsy.

It is also unfortunate that the Psycho-Biological Department of Yale University, which carries on such an extensive program of research with chimpanzees, did not delegate from time to time one of its highly trained and experienced investigators to observe and