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.

HJALMAR BROCH

UNIVERSITY OF OSLO
NORWAY

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

experiment with "Jimmy." The Philadelphia Zoological Garden, until a few months ago, neither had the facilities nor adequately trained observers nor, for that matter, any interest, to follow the physiological and behavioral changes that took place during the last years of "Jimmy's" life. And thus, from the viewpoint of a psycho-biologist, this very interesting and valuable subject passed away without enriching our knowledge. At present, under the leadership of the new director, Dr. R. Macdonald, steps are being taken to use the animals of the garden as something more than mere exhibits. It will, however, take some time to obtain and organize a sufficiently competent staff to carry out his plans.

"Jimmy" did not wait.

MICHAEL I. TOMILIN
PHILADELPHIA ZOOLOGICAL GARDEN

SELENIUM IN NATIVE RANGE PLANTS OCCURRING ON SOILS DERIVED FROM PERMIAN OR TRIASSIC (?) SEDIMENTS

SELENIFEROUS vegetation in Wyoming is, as has been pointed out before,[1] confined primarily to geological formations of Cretaceous and Eocene age. The Sundance formation, which is of Jurassic age, yields no seleniferous vegetation, at least from type sections examined so far.

During the past summer the Department of Research Chemistry of the University of Wyoming observed several hundred acres of seleniferous woody aster and narrow-leafed vetch growing upon red soils derived from the Chugwater formation in central Albany County, Wyoming. The Chugwater is in whole or in part of Permian or Triassic (?) age. Further inspection supplemented by chemical analyses brought out the fact that two horizons in the Chugwater formation were capable of supporting toxic seleniferous vegetation, one a sandstone member near the middle of the Chugwater formation and the other a limy sandstone in the basal portion of the Chugwater. The basal portion of the Chugwater in this locality is believed to be the stratigraphical equivalent of the "Embar" of central Wyoming. Of the two sandstone members it was found that the middle member carried considerably more selenium than the basal member. One sample from the middle sandstone member gave 10 parts per million of selenium. The average of a composite sample was found to be 2.4 parts per million.

The mere presence of selenium in rocks and soils of any geological formation has economic significance, in so far as native range plants are concerned, only when it becomes absorbed in quantities to be toxic. Finding seleniferous range plants in certain sandstones of Permian and Triassic (?) ages greatly enlarges the scope of the selenium problem.

O. A. BEATH
UNIVERSITY OF WYOMING

[1] O. A. Beath and co-authors, *Jour. Amer. Pharm. Assoc.*, 23: 2, February, 1934.

SOCIAL BEHAVIOR OF THE NORMAL AND CASTRATED LIZARD, ANOLIS CAROLINENSIS

EXPERIMENT reveals for the first time in any reptile species the presence of a true social hierarchy which differs in many respects from that of fowls. Nineteen males of *Anolis carolinensis,* ranging in weight from 7.5 grams to 3.9 grams, were found to arrange themselves in a series of dominance ranking which was closely correlated with weight. The largest males stood at the higher end of the scale (group I), the smallest at the lower end (group III), while those intermediate in size stood intermediate in the scale of dominance (group II).

Eight males in Group I ranked high in dominance with an average weight of 6.12 grams, five males in Group II ranked intermediate with an average weight of 4.96 grams, while the six males in Group III ranked low in dominance and their average weight was 4.73 grams.

Ninety-eight combats between males were carefully observed and recorded in detail. The males of Group I and II fought six encounters each, while those of Group III fought an average of three combats each.

The urge to acquire and to hold a certain restricted territory against other males was very marked. The resident male (one that had been in a particular cage for 24 hours or more) won 90 combats, but only eight fights were won by the non-resident (one introduced into the cage less than 30 minutes previous to the encounter).

This urge to hold territory was the more striking, since 38 encounters out of the total of 90 were won by resident males that weighed less than their opponents. The evidence indicates that resident males fight more viciously and more persistently than non-resident males.

The fighting pattern was found to consist of a chain of reflexes which, in a typical combat, at least, were expressed in almost an unvaried temporal sequence. Eight of these reflexes were expressed overtly, making it fairly easy to study the pattern objectively.

This fighting pattern has also been observed in castrated males and females but less in normal females. It is, therefore, inferred that the ovarian hormonal complex inhibits fighting reflexes in normal females.

LLEWELLYN T. EVANS
BIOLOGICAL LABORATORIES,
HARVARD UNIVERSITY