until identical illumination has been obtained, this diversity of photographic action, due to variation of exposure, or of development (of course with the proviso that such variations are never excessive), is apparently taken care of. At any rate, I find no difference in the results which can be traced to this cause.

Admitting that the little *a* band is four and one half times as intense in the spectrum of Mars, if we may assume that the intensity of the band is proportional to the total amount of vapor present in the combined air columns traversed by the rays, as it is very nearly in the case of incipient absorption, it is perhaps permissible to say, since the rays pass twice through the atmosphere of Mars, that on the average Mars has $0.5 \times (4.5 - 1.0) = 1.75$ times as much aqueous vapor in its atmosphere as that which exists above Flagstaff in the month of January, or roughly, since one and three quarters times the amount of water vapor in the surface air of Flagstaff would be 2.17 grains per cubic foot, or 5.0 grams per cubic meter, it may be concluded that the dew-point on Mars would be 33° F., if the distribution of moisture were the same in the upper air of the two planets. In this respect, however, there is a very wide divergence of conditions on the two worlds, since, as I have shown in my paper on "The Greenhouse Theory and Planetary Temperatures," in the *Philosophical Magazine* for September, 1908 (p. 469), the proportion of aqueous vapor existing at great elevations above the surface on Mars is very much greater than here. This is due to the comparatively rare atmosphere of Mars, to the low boiling point of water on that planet where water evaporates much more readily than here, and to the prevailing desert conditions, that is to say, to the infrequency of those atmospheric conditions which conduce to the formation of cloud and rain. Through these causes, aqueous vapor on Mars diffuses to greater heights and remains suspended in the air for longer intervals than with us. As a consequence, although there may be a very extensive protecting mantle of highly absorbent vapor which prevents surface radiation and conserves surface temperature, the dew-point at the surface remains low, probably seldom rising much above the freezing point, and the prevalent conditions on Mars are those of a mild but desert climate, as Professor Lowell has all along maintained.

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THE SELACHIANS ADMITTED AS A DISTINCT CLASS

EVER since 1873 (*Am. Journ. Sci.* (3), 6, 434, 435) I have claimed class rank for the Selachians or Elasmobranchiates. This view has been later accepted by most American ichthyologists, and notably by Jordan, since 1902.[1] At last two European naturalists, of great eminence, have come to the same conclusion.

Professor A. A. W. Hubrecht, in the *Quarterly Journal of Microscopical Science* for November, 1908 (p. 156), has stated that "a division of the vertebrates in the superclasses of Cyclostomata, Chondrophora, and Osteophora might suggest itself, Amphioxus remaining yet more isolated in its superclass of Cephalochordata. The CHONDROPHORA would then contain the Elasmobranchs, the OSTEOPHORA all the other higher vertebrates."

Mr. C. Tate Regan, in the *Annals and Magazine of Natural History* for January, 1909 (8. ser., 3, 75), has recalled that he had "already expressed the opinion that the true Fishes are at least as distinct from the Selachians, on the one hand, and the Batrachians, on the other, as any of the vertebrate classes are from each other, and are equally entitled to rank as a class,"[2] and insists on their claim to class distinction.

Hubrecht and Regan, it is true, are not the first or only European naturalists to differentiate the Selachians as a class from the Pisces, for Geoffroy Saint-Hilaire and La-

[1] Up to 1887 Jordan had regarded the Selachians as a "class Elasmobranchii"; from 1888 to 1902 he associated them with the Pisces under two subclasses, Selachii and Holocephali; in 1902 he reverted to his former view. (See "Guide to the Study of Fishes," I., 1905, pp. 506, etc.

[2] Regan, *Proc. Zool. Soc.*, 1906, p. 724, and "Biol. Centr.-Am.," Pisces, p. viii (1908).

treille did so nearly a century ago (in 1825), but almost all later Europeans have looked with much disfavor on such a separation. It must not be forgotten, either, that L. Agassiz, over half a century ago (in 1857), also separated the Selachians as a distinct class but, it should be said, he also differentiated the "Ganoids" as an equally distinct class.[3] It is scarcely necessary to add that the reasons for the present differentiation of the Selachians are different from those influencing the early zoologists.

It may be hoped, in the interests of vertebrate morphology, that the view that has at last found favor among such active European naturalists as those noticed will be more prevalent than heretofore.

THEO. GILL

SEVENTH ANNUAL MEETING OF THE AMERICAN SOCIETY OF VERTEBRATE PALEONTOLOGISTS

THE seventh annual meeting was held in the geological laboratory of Johns Hopkins University, Baltimore, Md., December 28–30, 1908.

The meeting was called to order by President R. S. Lull on Monday, December 28, at 2:30 P.M. The minutes of the preceding meeting were read and approved. The treasurer's report was read and accepted. A letter from Professor W. B. Clarke was read, giving notice of courtesies extended to the society. A letter from the U. S. Fish Commission was read, acknowledging receipt of resolution regarding extinction of the great marine mammals, stating the sympathy of the commission with the views there expressed, and asking for suggestions in regard to prevention of this extermination.

The president appointed Messrs. Williston, Case and Matthew a committee to nominate officers for the ensuing year.

On motion it was resolved that the business meeting be postponed until 10:30 A.M. on Wednesday and that the meeting proceed to the reading of papers.

The reading of the presidential address by R. S. Lull, on "Dinosaur Societies," followed. The address discussed the relationships and the geological and geographical distribution of the several groups of *Dinosauria* and suggested hypotheses of phylogeny and migration to explain these facts of distribution. (The address will be published elsewhere.)

Discussion: Dr. Williston expressed his sense of the importance and interest of the paper. He did not agree with the author in making the early Mesozoic migrations via a North Atlantic land bridge; a more probable alternative was by way of southern land connections. In favor of this view he pointed out our lack of knowledge of southern Mesozoic land faunæ, the easier communication at that time between the southern continents, and especially the presence of certain common types, such as Dicynodonts, in the early Mesozoic land faunæ of North America and Africa, although they are not found in the intervening northern land masses. He agreed with Professor Lull as to the Triassic age of *Nanosaurus*. In support of the lower Cretaceous age of a part of the Morrison formation he cited the discovery of *Morosaurus*, a Morrison genus, in the lower Cretaceous Trinity sandstone of Oklahoma. He believed that the American upper Cretaceous genera *Palæoscincus* (Judith River), *Stegopelta* (Lower Benton) and *Ankylosaurus* (Hell Creek) were closely related, if not identical, and were all derivable from *Polacanthus* of the Wealden of Europe. The recent discovery of *Ceratopsia* and of *Hadrosaurus* in the European Cretaceous reduces still further the supposed isolation of our late Cretaceous land fauna from that of Europe.

The meeting then adjourned. The second session was called to order at 9:30 A.M. Tuesday.

A specimen from the Conemaugh beds of West Virginia was submitted for discussion by Dr. White. The specimen appears to be the tibia or radius of a large reptile. Its nature and relationships were discussed especially by Drs. Williston, Case and Dean. It was considered to be beyond doubt a bone or natural cast of a bone of a large Pareiasaurian, exceeding in size and considerably older geologically than any known member of the order. On motion it was resolved that the society expresses its sense of the importance of the specimen and of the desirability of having it fully described and illustrated.

Dr. Williston then exhibited articulated skeletons of *Pariotichus* and *Lysorophus*, obtained for the University of Chicago in western Texas last summer. The reptiles of the American Permian included four chief groups, the Pelycosaurs, the Cotylosaurs (including Chelydrosauria) the *Pari-*

[3] Agassiz, "Cont. to Nat. Hist. U. S.," I., 1857, p. 187. Agassiz recognized three orders of Selachians ("Chimeræ, Galeodes and Batides") and six (?) orders of Ganoids ("three orders, Cœlacanths, Acipenseroids and Sauroids; and doubtful, the Siluroids, Plectognaths and Lophobranches").