Clubs and secret societies occupy the fourth chapter and nearly one third of the volume.

The conclusions to be drawn from the contents of the volume devoted to the existence and the future of culture society are scarcely touched, though they are so full of meaning. The author hints that altruistic ethical philosophy, on the strength of the facts here assembled, demands now a radical revision, since manifestly out of the sex and family impulses on the one hand, and the pure and simple impulses of social organizations on the other, two quite different and frequently downright antagonistic kinds of moral codes must arise. The struggle between these has been frequently remarked and treated in a poetic fashion, but the knowledge of their true significance will be made possible for the first time by the facts here set forth, and not only in the realms of custom, but in all the areas of human activity, the two sets of impulses are playing against each other and building up forms of society, in order subsequently to pull them down and destroy them.

There ought to be a good English translation of this work, which, ignoring the necessity of promiscuity at any time in human society, finds explanation of artificial social structures and functions in the inventive faculty, which has been able to create innumerable associations for men in their varied emergencies.

O. T. MASON.

SOCIETIES AND ACADEMIES.

NEW YORK ACADEMY OF SCIENCES. SECTION OF BIOLOGY.

A REGULAR meeting of the Section of Biology was held on April 14, Professor Bashford Dean presiding. The following program was offered:

J. H. McGregor, 'The Ancestry of the Ichthyosauria.'

A. G. Mayer, 'Color Patterns in Lepidoptera.'

C. C. Trowbridge, 'The Function of Interlocked Emarginate Primaries in Soaring Flight.'

Dr. McGregor accepted Baur's view that the Ichthyosauria are derived from Permian Rhynchocephalia, but stated that in a study of the Belodontia he had found new evidence as to the nature of the intermediate forms. The latter group is of undoubted Rhynchocephalian origin, and may almost be considered as a subdivision including forms modified for aquatic life. A comparison of Belodonts and Ichthyosaurs shows that both have evolved in the same direction, though modification has proceeded further in the Ichthyosaurs, which were marine in habit. Almost all of the skeletal features of the two orders are reducible to a common type, and, although not directly ancestral, the Belodonts must be considered as standing very near the line of descent of the Ichthyosaurs; the two orders probably had as a common ancestor some aquatic Rhynchocephalian of the upper Permian or lower Trias. The Ichthyosauria are thus brought into relation with the Archosaurian branch of the Reptilia.

Dr. Mayer presented the results of his study of the color patterns of 1,173 species of Lepidoptera: 453 *Papilio*, 30 Ornithoptera, 643 Hesperidæ, and 47 *Castina*. Counting sexual differences, 1,340 individual insects were examined; 542 *Papilio*, 59 Ornithoptera, 688 Hesperidæ, and 51 *Castina*. The number of rows of spots, bands, or combination markings upon the wings were counted, and as well the number of spots in each individual row, and the number of interspaces over which each band extended; the results show that each row of spots or bands exhibits a decided tendency to be of uniform color throughout, that rows very rarely break at or near the middle of their extent, and that the end spots of a row are more variable than those spots near the center. 'Frequency polygons' were obtained from the above-mentioned data, for the rows of markings, for the number of spots in each row, and for the extent of bands measured in interspaces. Eight such frequency polygons were determined for the spots and bands on the upper and lower surfaces of the wings in the group of Papilio + Ornithoptera, Of the four representing the conditions in the fore-wing, three exhibit two well-marked maxima, the numbers being arranged in descending series on either side of each. These maxima are three and nine spots, or bands extending over three or nine interspaces. If,

now, *Papilio* be divided into three subgenera, *Papilio* s. str., *Cosmodesmus,* and *Pharmacophagus,* and be still further separated into the African, Indo-Australian, Europo-Siberian, and American forms, it is found that the insects of the subgroups still display the tendency to have three or nine spots, or bands extending over three or nine interspaces. This is not a matter of correlation, for only 32 of the 453 species of *Papilio* display *both* three and nine spots upon their fore-wings. It is somewhat difficult to explain this condition upon the hypothesis of natural selection, owing to the fact that *Papilios* of widely separated regions show the same tendency to produce these two maxima in the same manner. The Hesperidæ and *Castina* show no such tendency, hence it is not universal for Lepidoptera. If it be due to natural selection acting upon *Papilios* and restricting them to this condition, such selection must be universally operative in the case of *Papilio,* but not in the other species. It is easier, therefore, to assume a race tendency in *Papilio* to produce either three or nine spots upon the fore-wing, or bands extending over three or nine interspaces. Other results, quantitatively expressed, were brought out by the author.

Mr. Trowbridge gave the results of observations on flying birds for the purpose of showing that the emarginate primaries of hawks, eagles and certain other birds are interlocked in flight. The speaker referred to his original paper on the subject in which the theory was set forth, which was presented by the late Professor W. P. Trowbridge before the National Academy of Sciences and the New York Academy of Sciences. The paper created some discussion in SCIENCE at the time, participated in by Dr. Elliot Coues, Professor Newberry, Professor Trowbridge and others. Mr. Trowbridge showed by a number of diagrams and photographs that the primary feathers of a number of birds are emarginate near their ends, and that the webs of the feathers are so shaped that when they are overlapped, a curved and rigid aeroplane is formed at the end of the wing, which, he considered, is of considerable advantage in swift sailing flight. The emarginations of the primaries of hawks and eagles are particularly pronounced, and permit firm interlocking. A table of observations was given, showing that the interlocking of the primaries does take place, the data having been obtained at New Haven during the autumn flights of hawks along the Connecticut coast. It appears that in the case of one species of hawk examined, ten wings out of forty had all five primaries interlocked, and that the number of wings having sixty per cent. of the primaries interlocked was twenty-nine, or 72 per cent. of the total number, forty. It was concluded that emarginate primaries of hawks and other birds are interlocked in flight on the following grounds: (1) it has been found that the webs of such feathers of hawks that had just been killed usually show deep notches where they have rested against one another, which notches could only result from habitual interlocking of the primaries; and (2), in every case of over 25 hawks killed while flying and examined immediately after they fell, *some* primaries were interlocked (several slightly wounded birds not included). In the case of 19 perfect specimens of one species, 67.9 per cent. of all emarginate primaries (190) were found to be interlocked. While it is not possible at present to show when the emarginate primaries are interlocked in flight, the indications are, however, that this occurs when the wing is partly flexed, as in the case of hawks sailing rapidly through the woods and flying in a strong wind. The important functions of interlocking appear to be (1) to make more rigid the outer portion of the wing, that part of the aeroplane formed by the primaries, and (2) to produce a curve of the wing which enables the bird to have a better control of its swift flight through the air than the unlocked condition would permit. The end of the bird's wing when the primaries are interlocked becomes shaped somewhat like the blade of a propeller screw. The interlocking also would keep the primaries extended without muscular exertion on the part of the bird.

Considerable discussion was aroused by Mr. Trowbridge's paper. Dr. Jonathan Dwight, Jr., presented a series of arguments against the theory of the speaker, to the effect, in

brief, that in the absence of a proper controlling musculature, any such interlocking as that described could be brought about only by accident; that habitual interlocking would bring about, furthermore, conspicuous wearing of the vane in the areas of contact, a phenomenon not observed in emarginate primaries; and that he concluded from his extensive studies upon feathers and feather structure, that habitual interlocking did not take place. Mr. Frank Chapman, with a series of fine lantern slides of birds in actual flight, demonstrated that in some soaring birds, at least, which possess emarginate primaries, these feathers are certainly spread and not interlocked. Mr. Chapman agreed with Dr. Dwight that the facts tend to support Allen's theory of the origin of emargination, namely, that aerial friction wears down the web; and that no such function is to be attributed to emarginate primaries such as that ascribed by Mr. Trowbridge. Prolonged discussion followed, participated in by Mr. Trowbridge, Dr. Dwight, Mr. Chapman, Professor Dean, Professor Crampton and others.

HENRY E. CRAMPTON,
Secretary.

SECTION OF ASTRONOMY, PHYSICS AND CHEMISTRY.

AT the April meeting of the Section Mr. Percival Lowell gave a very interesting paper on 'Modern Mars,' based on a series of maps of Mars.

1. Map-making of Mars began with Beer and Mädler in 1840. Since then many charts have been constructed of the planet. Some of these are so old as to have been more or less forgotten, some so new as not yet to be known. Collection and comparison of such of these maps as have marked advances in the subject lead to some not uninteresting conclusions. Such are presented in the accompanying series.

2. The series consists of twelve maps.

I.	Beer and Mädler	1840
II.	Kaiser	1864
III.	Dawes by Proctor	1867
IV.	Résumé by Flammarion	1876
V.	Schiaparelli	1877
VI.	"	1879
VII.	Schiaparelli	1882
VIII.	"	1884
IX.	Lowell	1894
X.	"	1897
XI.	"	1899
XII.	"	1901

3. These maps fall naturally into three groups, dividing the history of areography into as many stages.

I. Those from 1840–1877
II. Those from 1877–1892
III. Those from 1892–1902

4. The maps of the first group are characterized by large patches of light and dark areas. Maps I.–IV. show these patches, and by their agreement prove that the patches are permanent in place. For the maps are the work of different observers made at different epochs of time.

5. The maps of the second group are distinguished by a network of fine, straight lines covering the bright areas of the disk, the 'canals' of Mars. This was the work of Schiaparelli.

6. The maps of the third group are differentiated by a similar system of 'canals' in the dark regions. This is the work since Schiaparelli. It has resulted in a complete change in the belief as to the character of these 'seas'; the permanency of the lines showing that the background must be land, not water.

7. Inspection of the series results in three deductions:

I. That the whole series are in fundamental agreement.

The basic features appear directly throughout the first period and as a groundwork upon which subsequently discovered detail is imprinted in the second and third.

8. The second deduction from these data is:

II. That the almost inconceivable regularity in the 'canals' was an evolution in perception forced upon Schiaparelli by the objects themselves; not a feature imparted by him to them.

His first map, in 1877, showed them as arms or inlets of the sea penetrating the continent to great distances, but not characterized by remarkable regularity of form. His

second map, in 1879, shows them narrower, straighter and in every way more peculiar. His third map, in 1882, presents them as of geometric precision; as he himself remarks, as if laid down by rule and compass. His fourth map shows that they afterward kept such a character.

Had their precision been of his devising, they should not have gained in it as time went on and his eye grew versed in decipherment. That they did so implies that the recognition was forced upon him from without.

9. The third deduction is:

III. That an evolution in detail marks the series, and can be traced steadily on from the beginning to the end. The additions made in each period find themselves superposed upon the work of the period before. Similarly each map of any given period adds to its predecessor and is corroborated and extended by its successor. Thus a chain of evidence is made by them whose strength depends upon this very intertwining of results.

The discussion called forth by the paper was participated in by many, among whom was Mr. Nikola Tesla. S. A. Mitchell.

TORREY BOTANICAL CLUB.

A meeting of the Club was held at the New York Botanical Garden on May 28.

The first paper on the program was by Mrs. N. L. Britton under the title of 'Remarks on West Indian Mosses.' Comments were made on several questions of synonymy and nomenclature arising from a study of collections recently made in Porto Rico by Mr. A. A. Heller and by Professor Underwood, and in St. Kitts by Dr. Britton. Attention was directed particularly to the genus *Sematophyllum* Mitt. 1864 (=*Raphidostegium* De Not. 1867=*Rhynchostegium*, section *Raphidostegium* Br. & Sch. 1852). This genus is chiefly tropical or subtropical in its distribution, though eleven species are known to occur in North America, north of Mexico.

The second paper was by Dr. P. A. Rydberg on 'Some Genera of the Saxifragaceæ.' The speaker presented some of the results of studies intended as a contribution to a projected work on the flora of North America. The family name Saxifragaceæ was used in a restricted sense, excluding *Ribes, Hydrangea, Philadelphus, Parnassia, Itea,* etc. The members of the family in this narrower sense are all herbaceous plants, with the exception of a single species of *Heuchera* which has a sort of aerial woody stem. Dr. Rydberg commented especially upon the genera *Bolandra, Therofon, Telesonix, Hemieva, Tiarella, Heuchera, Tellima, Lithophragma, Mitella,* and *Chrysosplenium,* referring to the geographical distribution and number of species of each. Heuchera is the largest of these genera, being represented by 58 species in North America including Mexico. The paper was discussed by Dr. Britton and others.

Professor F. S. Earle made a brief report on a recent trip to western Texas and Eastern New Mexico, stating that 800 numbers of botanical specimens were collected. April and May seemed too early in the season for finding many herbaceous plants in flower, and this was especially the case with the monocotyledons.

Dr. N. L. Britton showed specimens of *Washingtonia longistylis* collected a few days previously near Washington, D. C., differing from Torrey's type of the species in greater hairiness.

Mrs. Britton alluded to the organization of 'The Wild Flower Preservation Society of America.' Professor Earle remarked upon the region west of the Pecos River, where vegetation has been nearly exterminated by overstocking with cattle, as a proper field for the activities of the society.

Dr. MacDougal showed a corm of *Amorphophallus,* kept for twenty months in a dark room, where it had flowered. New buds, apparently adventitious, had formed near its base.

Marshall A. Howe,
Secretary pro tem.

DISCUSSION AND CORRESPONDENCE.

ZOOLOGICAL NOMENCLATURE IN BOTANY.

To the Editor of Science: On returning from Central America I find Dr. Dall's note