cates. As the same state of affairs exists in many other libraries, it seemed to me that it would be of mutual advantage to ourselves and others to prepare a list giving the names of both our own 'wants' and of the publications we could supply to others, to assist them in completing their files. This was done, and mimeograph copies of the list were distributed to our correspondents and exchanges during the latter part of 1901. The success of the plan was marked, and for some of the volumes on our list more inquiries and requests were received than we could at that time satisfy. In my annual report for that year (1901, p. 13) I suggested that it might be of value to develop this plan of mutual exchanges into a more comprehensive scheme, having for its basis some large central exchange or 'clearing house' to which all astronomical and scientific libraries might send their duplicate papers and publications, and from which they might in return be able to obtain the volumes or numbers of other publications required to complete their own sets. The suggestion has met with favor from many scientific men, and it is hoped that some arrangement may be made for carrying it into effect at an early date. Some expense is of course involved for correspondence and the publication of exchange lists, but a large part of this could be met by the payment of a small annual fee, if a sufficient number of societies and institutions would join in the development of the plan.

Since the publication of our first exchange list two years ago, we have ourselves received a large number of additional duplicates, partly in exchange, and partly by presentation. The most important gift of the latter class was the one from Miss M. W. Bruce, whose valuable donation of her sister's library to our collection was noted and acknowledged in Science (Vol. XV., p. 758, May 9, 1902) and more fully in my annual report for the same year ('Miscellaneous Scientific Papers of the Allegheny Observatory,' No. 12, p. 9). In order to render these additional duplicates available for distribution we have prepared a new exchange list which will be distributed to our regular correspondents, and will also be sent on request to all interested. Correspondents desiring any of the volumes on this list will kindly indicate the titles of publications they are prepared to offer in return, particularly any of those included in our 'wants,' and we will accept all equitable proposals for such exchanges and fill them in the order in which they are received. It is hardly necessary to state that none of the volumes of this list are for sale, but are only offered in exchange.

In order to determine more fully the possible scope and usefulness of the general plan of a central exchange bureau such as has been proposed above, correspondents are requested to give also a list of the publications which they desire to obtain which are *not* included in our present catalogue, together with a list of all the duplicates in their own library which they would be willing to send to this bureau if it should be established for the purposes indicated. If sufficient interest is manifested and sufficient material offered to meet the mutual 'wants' of those willing to cooperate in this plan, the Allegheny Observatory will undertake to furnish the requisite facilities in the way of storage and packing rooms, and will attend to the assorting, packing and correspondence necessary to effect the exchanges desired on an equitable basis to all parties concerned.

F. L. O. Wadsworth.
Allegheny Observatory,
September, 1903.

## TOXIC EFFECT OF O AND OH IONS ON SEEDLINGS OF INDIAN CORN.

In a recent article in these columns* on 'The Toxic Effect of H and OH Ions on Seedlings of Indian Corn,' the author has apparently overlooked my investigations published some seven years ago.† In the part of the article dealing with the effect of H ions upon the seedlings of Indian corn the reader is led to infer that the author is a pioneer.

In my work I tested the effect not only of

* Science, **18**: 304. 1903.

† 'Toxic Effect of Dilute Solutions of Acids and Salts on Plants,' *Bot. Gaz.*, **22**: 125. 1896.

HCl and $H_2SO_4$ but also of $HNO_3$, HBr and $C_2H_4O_2$ upon the seedlings of *Zea Mais*, and arrived at practically the same conclusion. I not only called attention to the fact that the seedlings of Indian corn are much more resistant to H ions than those of *Lupinus albus* used by Kahlenberg and True* but also that they are able to withstand a solution of HCl or $H_2SO_4$ four times as concentrated as are the seedlings of *Pisum sativum*.

It is true that the exact concentration of $H_2SO_4$ and HCL which I found to inhibit the growth of corn roots differs somewhat from the figures given by Dr. Loew. This variation in the results may easily be explained by the different methods of experimentation.

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## SHORTER ARTICLES.

### A LITTLE KNOWN DEVIL-FISH.

IN the *Annals and Magazine of Natural History* for August, 1897 (XX., 227), Boulenger published a 'Description of a New Ceratopterine Eagle-Ray from Jamaica,' which he named *Ceratobatis Robertsii*. I was reminded thereby of a species described many years before (1862) by Richard Hill in an article on 'The Devil-fish of Jamaica' in 'The Intellectual Observer' (II., 167–176). Therein he named a small species *Cephaloptera Massenoidea* on account of a supposed resemblance to the *C. Massena* of Risso. I find that Hill's name and article are unknown to ichthyologists generally and, therefore, a note on the subject may be of use at the present time and call attention to some unappreciated facts.

The fish of Boulenger had a disk 13.77 inches long and 30.70 inches wide; the tail was 24.40 inches long. It was assumed that 'this ray grows to a very large size,' and that 'the single specimen secured by Mr. Roberts, the dimensions of which are recorded above, is a young one.'

The species of Hill had a length of 25½ inches 'from the centre of the head to the dorsal fin' and the width was 48 inches; the tail was 30 inches long. It was a female, having 'a fœtus just mature for extrusion, 16 inches broad,' and consequently full grown or at least sexually mature.

Hill's description is not sufficiently full to enable an identification to be made from it alone with Boulenger's specimen. No mention is made of the dentition which is said by Boulenger to be 'restricted to the upper jaw' in his species. Furthermore, there is an apparent discrepancy in the relative proportions, but this may be due to the difference of the points between the measurements. The proportion of the sum of the length of the disk and tail to the width, in Hill's specimen, is not irreconcilable with the proportions of Boulenger's fish. It is improbable, too, that two small species of the same family should be inhabitants of the same waters. Whether there are or are not is a problem for native Jamaican naturalists or visitors to the island to determine.

Boulenger's measurements are given in millimeters; Hill's in feet and inches. Reducing Hill's to millimeters the principal measurements are as follows:

| | Boulenger. | Hill. |
|---|---|---|
| Length of disk..... | 350 | 648 |
| Width of disk..... | 780 | 1,218 |
| Tail ..... | 620 | 762 |

The difference in size between the species in question and the gigantic devil-fish is remarkable. Another individual (which must have been of another species) was noted by Hill as caught shortly after the one he described which had a disk 15½ feet wide and 9½ feet long and a tail only 2 feet long.

The pregnant mother of the species described by Hill was considerably less in size than the fœtus procured from the body of another female killed in Jamaica many years previously; that fœtus was 'five feet broad.'

Such differences in size even might possibly be within specific variation, but as the differences are coordinate with other structural characters, they can not be in this case.

THEO. GILL.

* *Bot. Gaz.*, **22**: 81. 1896.