The French delegates insisted upon dividing the passengers into isolated groups, so that each group might be released separately at the expiration of five days from the occurrence of the last case. Other delegates objected to any detention for a longer period than is necessary for the thorough disinfection of the vessel and the personal effects of the passengers. This modified system of quarantine, or 'medical inspection,' if well executed, and with the application of approved methods of disinfection, would doubtless afford the greatest possible security with the least possible interference with commerce, and injustice to individuals; whereas the old-fashioned quarantine is regarded by the more enlightened nations of Europe as untrustworthy and barbarous. Dr. Koch, the discoverer of the 'comma bacillus,' was in favor of the system of medical inspection as above defined.

It would be out of place in the present paper to give more in detail the conclusions reached by the conference with reference to sanitary regulations to be adopted at the port of departure, at sea, and at the port of arrival, the special measures recommended for the Red Sea and Suez Canal, the directions for disinfection, etc. But, as showing in outline the general sentiment of the delegates with reference to the most important preventive measures, we may quote the following proposition, which was introduced on the last day of the session by the delegate from the United States, and was adopted with but a single negative vote (Turkey).

"The measures recommended against cholera are, in general, applicable to yellow-fever, and to other diseases which prevail in epidemic form under the influence of bad sanitary conditions, and which are transmitted by human intercourse.

"The most effectual means for preventing the propagation of diseases of this class are: The sanitary improvement (*assainissement*) of seaport towns, and of vessels sailing from infected ports; isolation of the sick; and disinfection of infected or suspected articles and localities."

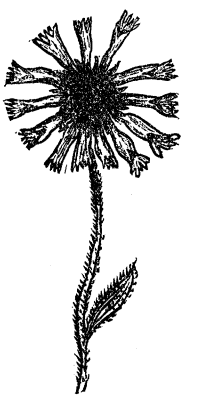
Baltimore, July 30. GEO. M. STERNBERG.

LETTERS TO THE EDITOR.

**** *Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

An abnormal Rudbeckia.

An interesting specimen of Rudbeckia hirta, L., was recently found among a patch of plants by my brother, Mr. Davis L. James. It differs from the normal type in such a manner as to deserve notice. It had the ordinary form, with the black conical centre. There were thirteen yellow rays. Two of these were of the usual shape, ligulate, with notches at the end; three were tubular, and with five lobes; and the remainder split open near the end, and the ray spread out. All the rays were *fertile*, although the generic character is 'rays neutral' (Gray, 'Manual,' p. 254). There can be no doubt as to the species, as it is a very common and familiar plant in this neighborhood. The sketch shows the appearance of the flower. It seems almost like an intermediate stage between the typical composite and a blossom with a number of large tubular flowers in a head. Can it be a reversion to some ancestral form?



JOSEPH F. JAMES.

Cincinnati, O.

The ginkgo tree.

Some years ago I received fruit from the Ginkgo (Salisburia adiantifolia) from Tennessee, and since then I have heard of a number of cases. My impression is, that, in the latitude of southern Pennsylvania and Virginia, it is rather common for this exotic to fruit.

WM. H. BREWER.

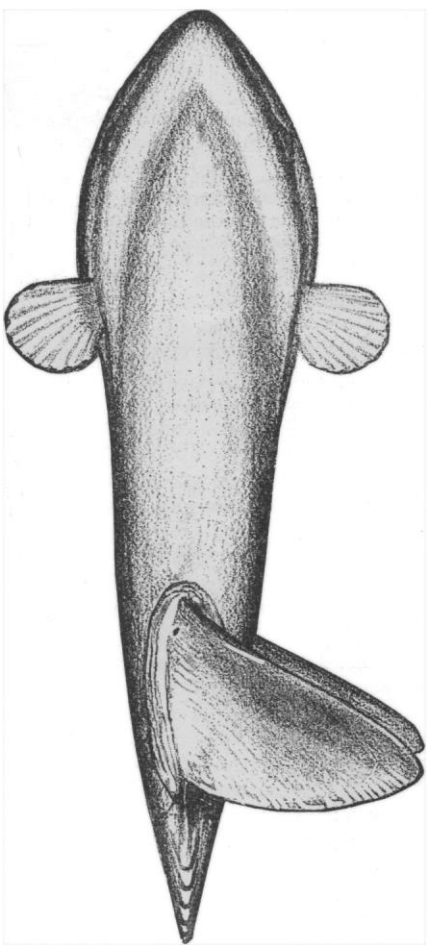
New Haven, Conn., July 28.

The swimming-habits of the sunfish.

The accompanying figure may at first puzzle the reader, but a little explanation will make it comprehensible. It is a view of the sunfish, or Mola, as seen from the back, the beholder looking down upon the animal from above as it swims in its own peculiar way. The individual from which this sketch was taken was caught in a trap-net at Quisset Harbor, Mass., and afterwards towed in a strong bag-net with a steam-launch from Quisset to Wood's Holl, where it was placed in one of the large pools constructed south of the laboratory for the Fish commission under the direction of Professor Baird. The fish measures about five feet in length and three in width: in fact, it may be considered adult. Since its removal to its new home, the animal seems quite contented, and has afforded an unusual opportunity to observe the manner in which its fins are used. The manner in which these organs are moved is so peculiar that it has been thought advisable to give a brief account of the means by which they are made effective as locomotive organs.

One does not need to watch this fish long in its

native element to discover that the great dorsal and anal fins are almost its sole organs of propulsion. In the figure, both are shown with their tips thrown over to the right side. This movement is synchronous in these great fins; that is, both strike in the same direction at the same time. But the most remarkable feature about them is, that they are twisted into the form of the blade of a propeller-wheel at the commencement of each stroke, as shown (not very clearly) in the figure, where the foreshortened dorsal is indicated in the condition which it presents at the moment



MOLA ROTUNDA (viewed from above, $\frac{1}{12}$ nat. size).

when the stroke to the left is about to begin. The direction of the peculiar twist of these fins is also reversed at each successive stroke, in opposite directions, so that a most effective propelling apparatus exists, which it would be somewhat difficult to imitate by a mechanical device. This contrivance is rendered all the more effective in consequence also of the great width of the fish, by which great stability is secured.

A very peculiar soft oval ring of dermal tissue around the bases of the dorsal and anal, renders them readily movable by means of the tendinous terminations of the muscles which are inserted into the strong bases of their rays. A similar band of soft dermal tissue is found on both sides of the base of the broad, crenulated, rigid tail, which is moved on its base just as the rigid rudder-blade of a vessel is moved by means of the rudder-chains. In the case of Mola, however, the single pair of rudder-chains as found in a vessel is replaced by a single series of tendons on either side of the median line, running parallel, and passing through round canals in the soft elastic base of the caudal, and inserted into the bases of the caudal rays.

The office of the curiously modified caudal of Mola seems to be solely that of a rudder, no vibration whatever of the tail being apparent when the animal is swimming in a straight line. Only when the creature wishes to turn is it deflected from the median line at its tip; and even then its apex sweeps through an arc of not more than twenty-five degrees at most, usually much less.

The pectorals are comparatively small, and, in swimming in a straight line, are extended horizontally and kept rigid and motionless by the animal, as if merely for the purpose of keeping the body vertical. When swimming with the sides of the body at an angle with the plane of the horizon, one or the other of the pectorals is folded closely against the side.

It thus becomes evident that Mola uses almost exclusively the dorsal and anal fins as locomotive appendages, and that the tail and pectorals act respectively as the rudder and as balancers, and take no active, but only a very subordinate, share in effecting the creature's movements. Even the rudder-like tail may be said to be defective; for it was noticed that the fish, when first placed in the pool, was unable to turn quickly enough to avoid bumping its snout against the stone walls at the angles of the enclosure.

The organization of this creature is probably the most remarkable of any encountered amongst the Teleostei. The body is incased in a very thick inflexible skin, and all of the lateral musculature has become subordinated to the office of flexing the vertical fins. In fact, so extreme has been the muscular specialization, that the myotomes have been entirely suppressed, and the lateral muscular masses developed into long muscles, ending in tendons.

No less remarkable has been the mode in which the tail has been developed through a larval form, probably provided with a lophocercal tail, which has already disappeared in the stage represented by Molacanthus. Mola, in fact, is the best-known example of a type having a gephyrocercal structure. No less extreme is the modification of the cerebro-spinal nervous system; for, as a result of the muscular specialization already noticed, the medulla spinalis has been excessively abbreviated. We are, accordingly, forced to admit, that Mola is the most extremely modified teleost in existence, notwithstanding the fact that a great many very singular deep-sea forms have been described within a very recent period.

The great advantage of having the large pools of salt-water enclosed by heavy stone walls also becomes very apparent in the instance of Mola, and shows how valuable they may become as aids in the study of the habits and modes of life of such large marine forms as dolphins, porpoises, sharks, swordfish, etc., — types in which the Fish commission is interested, as affecting the abundance of certain of the food-fishes.

JOHN A. RYDER.