the true axolotl is found south of that line. He was unaware of Tegetmeier’s observation. He further declared that Prof. Baird was aware of the metamorphosis of all the North American species of *Siredon* so-called, excluding *S. mexicanus,* years before the observation of it by Duméril, though he had at first named one of them *Siredon lichenoides,* in the belief that it was adult. Cope considered the observation of Duméril important, as showing that siredons reproduced as such.

Finally, according to Boulenger (7), the *S. lichenoides* and *mexicanus* of Baird are synonymous, the Paris axolotl is identical with the same species, and the perfect form into which it changed is identical with *A. tigrinum, mexicanum,* and *mavortium* of Cope, *obscurum* of Baird, while the form named *Siredon gracilis* by Baird is probably the larva of *Amblystoma tenebrosum.* Boulenger adopts the name *A. tigrinum* of the synonyms given above, and gives as the distribution United States and Mexico ; the specific diagnosis is—series of palatine teeth extending to external fissure of choanæ; plicae of tongue radiating from behind; costal grooves twelve ; head large ; brown or blackish, with yellow markings.

It is therefore very probable that the Paris specimens were really Mexican axolotls, and there is no doubt that these animals do in captivity undergo metamorphosis. So far as is known, they never do so in their natural conditions. But the animals are specifically identical with *A. tigrinum,* which is found in many parts of the United States, from New Jersey to California, and normally breeds in the Salamandroid condition. It is not known at present whether the larva of *A. tigrinum* ever attains sexual maturity in other regions where the species occurs besides Mexico. It is not improbable that it does so. De Filippi (8) found in a marsh on the shores of the Lago Maggiore 48 larvæ of *Triton alpestris* in the branchiate condition, which contained fully developed ova and spermatozoa, so that the occurrence of sexual maturity in the larvæ of *Amblystoma* is not unique. Prof. August Weissmann (5) has discussed at considerable length and with much thoughtfulness the true significance of the phenomena exhibited by the axolotl, and has concluded that its ancestors passed through the normal life-history of *Amblystoma,* the climate of the Mexican tableland having been at one time moist enough to permit of the existence of a terrestrial Salamandroid ; that the climate has now became so dry and unfavourable to vegetation that no amphibian can live in it except in water ; and that *Amblystoma* has become adapted to these conditions by ceasing to pass through its metamorphosis, and breeding entirely in the branchiate condition. Thus the metamorphosis which takes place occasionally in captivity is a case of what has been called since Darwin’s epoch atavism ; its peculiarity consists in the fact that the evolution of the animal has resulted in the arrest of development at a larval stage, and the occasional reversion is the continuation of the development to the higher condition of the ancestor. Atavism is the occasional resemblance of one individual to some remote ancestors instead of to its immediate parents. Another possible way of explaining the axolotl is to suppose that it has remained in the perennibranchiate condition while other members of the same species elsewhere have developed into the Salamandroid condition. This explanation cannot be the true one. It would necessitate the belief that a metamorphosis lasting a few days or weeks, and induced often by the gradual removal of the animal from water into air, could produce the same specific characters as a gradual development which has occupied a great number of generations. The axolotl is an example of one of the most curious and interesting modes by which animals may be adapted to their conditions, and two species formed out of one. At present the disappearance of the meta­morphosis from the life-history of the axolotl has taken place so recently that not even specific differences exist, according to some observers, between the metamorphosed axolotl and the natural *Amblystoma tigrinum.* At some future time slight differences are almost sure to occur, and then there will be two species or the tendency to metamorphosis in the axolotl will be lost. In the latter case some slight differences will probably be developed between the axolotl and the branchiate larva of *A. tigrinum* in other parts of America ; and then the axolotl and *A. tigrinum* will be two species. Finally, it may be pointed out that it is possible that the axolotl could have reached its present locality and conditions without any change in the climate of Mexico. The lakes in the arid district might somehow occasionally be visited by breeding *A. tigrinum,* and of the larvæ so produced in them some might become sexually mature before metamorphosing, and so give rise to the present axolotls.

There is some reason to believe, according to the American zoologist Prof. Cope, that the perennibranchiate *Menobranchus lateralis,* Tschudi, of the Mississippi, which when full grown is over a foot in length, and has four branchial apertures, stands in the same relation to the genus *Batraehoseps,* Bonap., as *Siredon* to *Amblystoma.*

*Literature.*—(1) A. Duméril, *Comptes Rendus,* vol. lx., 18G5, p. 765; (2) A. Duméril, *Nouv. Arch. Mus.,* ii., 1866; (3) A. Duméril, *Copmtes Rendus,* vol. lxi.

p. 775; (4) M. Blanchard, *ibid.,* vol. lxxxii., 1876, p. 716; (5) A. Weissmann, *Zeitschr. f. wiss. Zool.,* xxv. p. 297 ; (6) M. von Chauvin, *ibid.,* xxvii. p. 522; (7) G. A. Boulenger, *Brit. Mus. Cat.—Batrachia gradientia,* &c., 1882; (8) De Filippi, *Archivio per la Zoolagia,* 1861 ; (9) De Saussure, *Verhandl. d. Schweiz. naturforsch. Gesellsch. Einsiedeln,* 1868; (10) E. D. Cope, “ Metamorphosis of Axolotl,” *Amer. Journal,* 1871; (11) O. C. Marsh, *Amer. Jour.,* [2], xlvi. p. 364; (12) Tegetmeier, *Proc. Zool. Soc.,* 1870. (J. T. C.)

SIREN. *Siren lacertina,* Lin. *(Syst. Nat.,* i., Addenda), is an animal belonging to the class Amphibia *(q.v.).* It forms the type of the family *Sirenidæ,* called by Prof. Huxley *Trachystomata,* among the group *Perennibranchiata.* The body is elongate and eel-like, only the anterior limbs being present ; the posterior are entirely wanting. The anterior limbs are short and feeble, and each is furnished with four digits pointed at the ends. The head is small ; the snout is short and broad, and the nostrils are placed at its extreme end. The tongue is free anteriorly. The jaws are destitute of teeth and covered with a horny sheath like a beak. There are numerous teeth on the vomer, arranged in two large patches con­verging anteriorly. The eyes are very small. On each side of the neck are three branched external gills attached to the first, second, and third branchial arches ; and below the gills are three reduced branchial apertures. The tail is shorter than the body, much compressed, and provided with a median membranous fin ; the tail terminates in a point. The skin is smooth, and black in colour, some­times sprinkled with white dots. *Siren* grows to a large size, some specimens measuring 3 feet in length ; the largest example in the British Museum is 670 mm. or about 2 feet 3 inches. The animal inhabits the stagnant waters of marshes in South Carolina and Texas.

The only other member of the family *Sirenidæ* is *Pseudobranchus striatus* (Gray, *Brit. Mus. Cat.—Batrachia,* 1st ed.). This animal resembles *Siren* in most respects, but has only a single branchial aperture on each side, and only three digits to the anterior limb. Its colour is dark- brown with a broad yellow band on each side and a narrower one inferiorly. It occurs in Georgia, but seems to be very rare ; there are two specimens in the Paris Musée, none in the British Museum.

Figures of *Siren lacertina* are to be found in the following works :—Cuvier in Humboldt’s *Obs. Zool.,* i. pl. 11 ; Daudin, *Reptiles,* viii. pl. 49 ; Holbr., *N. Amer. Herp.,* pl. 34. *Pseudo­branchus striatus* is figured in Duméril and Bibron, *Erpétologie Générale,* pi. 96; Holbr., *loc.* *cit*., pl. 36; Leconte, *Ann. Lyc. N.* *Y*., 1824, pl. 4 (under name *Siren striata).*

SIREN, or Syren. See Acoustics, vol. i. p. 109.

SIRENS, fabulous creatures of Greek mythology, that, like the Loreley of German legend, lured mariners to destruction by their sweet song. In the *Odyssey* Ulysses sails past their island; but, warned by Circe, he had stopped the ears of his crew with wax and caused himself to be bound to the mast. In Homer they are two in number, but in later writers they are generally three, and are located on the coast of Italy, near Sorrento and Capri, or on the Straits of Messina. The tomb of one of them, Parthenope by name, was shown at Naples in Strabo’s time. A sanctuary of the Sirens stood on a headland near Sorrento. According to Eratosthenes the Sirens were a three-headed rock separating the Bay of Naples from the Gulf of Salerno ; but Strabo says they were three rocky islands on the southern side of the cape. The cape itself (now Cape Campanella) was sometimes called the Cape of the Sirens. When the Argonauts drew near the isle of the Sirens, Orpheus struck up and drowned their song. According to Hyginus the Sirens were daughters of the river Achelous and the muse Melpomene, and because they had not rescued Proserpine from Pluto they were turned by Ceres into winged creatures, who were to live only so long as no one passed by them as they sang. So, when Ulysses had eluded them, they flung themselves into the sea. According to another story, they were