logy in 1886, also those relating to ornithology for the same year (Ant. Reichenow). Dr. O. Boettger gives the herpetological works of 1886; Dr. F. Hilgendorf the ichthyological, and Drs. G. Pfeffer and W. Kobett the malacological.

Captain Fielden of the English army has discovered that the African monkey *Cercopithecus callitrichus* has become wild in the island of Barbadoes, W. I.

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**EMBRYOLOGY.**

**Extra-Ovarian Primordial Ova in the Human Embryo.**—Dr. W. Nagel\(^1\) reports the discovery of primordial ova in the strip of epithelium which is present on the outer side of the Wolffian body of human embryos. This discovery renders it pretty certain that the reproductive tissues were at one time much more extensively developed than in the present human species, probably in some premammalian type from which man and other mammals, birds, reptiles and batrac- chia have descended. It is certain, at any rate, that the only living forms in which the reproductive or germinal tissue is developed throughout almost or quite the whole of the extent of the dorsal portion of the body cavity are some of the fishes. This discovery compares in importance and significance with that of Rathke made about forty years since, when that brilliant investigator announced the presence of branchial clefts during the early embryonic condition of all the higher vertebrates. Embryologists will await the publication of Dr. Nagel's completed studies upon extra-ovarian primordial ova with great interest.

**Karyokinesis in Larval Amblystoma.**—Last spring, through the kind offices of Miss Fanny R. M. Hitchcock, of New York City, the present writer came into the possession of a lot of the living ova

of a species of this genus of Urodele batrachians. They were placed in the aquaria of the biological school, and a goodly number were hatched out, but some of the ova were attacked by a unicellular green alga, which multiplied rapidly upon the zona radiata, and between the latter and its thick gelatinous covering, in a single layer. These algae probably intercepted the oxygen. At any rate the embryos in all the eggs thus affected eventually died before their escape from the egg.

The embryos which had just hatched were found to be exceedingly interesting subjects in which to observe karyokinesis, or indirect cell-division. Nuclear spindles could be readily detected in all the tissues of the body in the greatest variety of stages. A few days after hatching the nuclear spindles became far less abundant and not so easily found. In sections of just-hatched embryos one could find nuclear spindles in all the tissues of the body, though most rarely in the muscles. They were particularly well-shown in the tissues of the brain, spinal cord, cranial ganglia; the prochondral tissue masses, from which the cartilaginous branchial bars are formed; in the blood corpuscles both in the vessels and heart; in the connective tissues, and in the epidermis as well as even in the notochord. The epidermis of the young Triton or Salamander has been commended for the purpose of illustrating karyokinesis in the laboratory by European teachers of histology. It is, therefore, with much pleasure that I point out the occurrence of a type in this country which is tolerably abundant and accessible, which serves even a better purpose, as it illustrates the fact that karyokinesis is universal, or holds with respect to all of the tissues of the body during the early stages of development.

This type is also well adapted for the purposes of elementary teaching, in that the cells and muscle-fibres are very large, so that the spindles are likewise very large. The filaments of chromatin are also very large, thick and sharply defined, so that all of the phases of nuclear metamorphosis may be readily traced with moderate powers of the microscope.

The method of preparation which I found to serve my purpose very well was as follows: The embryos were killed and hardened with corrosive sublimate or Kleinenberg's picro-sulphuric acid. After hardening and thorough washing in repeated changes of weak alcohol, if corrosive sublimate is used, or in 70 to 80 per cent. alcohol if picro-sulphuric acid is used, the embryos are stained in toto in a dilute solution of haematoxylin; Kleinenberg's or Delafield's answers admirably, though even a simple saturated solution of extract of logwood in alcohol, saturated with potash alum, also gives good results, but not
so clear and fine as when one uses the best haematoxylin crystals. This last solution must be diluted with alcohol saturated with alum if over-staining is to be avoided. And if either of the preceding dyes, Kleinenberg’s or Delafield’s, is used, it should be diluted until the solution is not too opaque to read through if placed over print in a glass dish to the depth of one-quarter inch. In this the embryos may be left sixteen to twenty-four hours, or until they are dark purple.

The embryos may then be embedded in paraffine and sectioned lengthwise, and some in a vertical and others in a horizontal plane, as well as transversely and mounted serially in the usual way with the aid of a fixative. This gives a complete view of the organization of the larvae, as well as a good opportunity to study the karyokinetic displays thus rendered visible by the haematoxylin. The chromatin threads are deeply stained by the dye and come out very sharply, and contrast with the rest of the substance of the cells.

The connective tissue which forms the cores of the branchial plumes is very interesting at this and later stages, as its cells are vesicular or form a meshwork tensely filled with fluid, which forms a supporting structure similar in function to the vesicular tissue of the axial notochord.

Around the connective tissue cores of the branchial plumes, and overlaid by the epidermis, the branchial vessels form a meshwork which is thus brought close to the surface for purposes of respiration. The tips of the tails of more advanced larvae are attenuated for a short distance into an upwardly bent point which recalls the opisthure of some larval fishes, as well as the upward flexure of the notochord in those types where the phenomena of heterocercy are almost universal. This fact indicates that some of the types ancestral to the lower Batrachia may have been heterocercal.

The lateral sense organs in just-hatched larvae are also conspicuous, and form two rows along the sides of the trunk and but one over the sides of the tail. Over the sides and top of the head they are more crowded together and never elongated as in Amia. On the inferior side of the head the rows of sense organs follow the direction of the now-closed branchial clefts; three curved rows of them may be made out on either side of the median line. In surface views a minute circular patch of pigment marks each sense organ, around which there is an annular colorless ring.—John A. Ryder.