of its centrosomes could not be followed with certainty. Chromosomal vesicles are formed at the anaphase of the division. The cleavage furrow appears first at the animal pole and proceeds faster at this side than at the vegetal. The 2-cell stage is reached within about two hours after spawning, then after half an hour comes the 4-cell stage, and the 8-cell stage after still another half hour.

For the account of the further development no detailed study has as yet been made, and it must be postponed to future communications; a rough sketch of observations may, however, not be superfluous here.

As I have before noticed in *C. echinata,* the blastomeres arrange themselves in a spiral manner in the present species also. The spirality is not so regular as is seen in those typical cases, such as in Turbellaria, Polychaetes and Gasteropods.

A gastrula is formed by the 18th to the 20th hour. It has cilia all over the surface of body, but is still inclosed within the egg membrane, often with the polar bodies attached at one side. The so-called *dipleurula* stage also is passed within the egg membrane, and it is not until the *metadoliolaria* is fully formed, when three and a half days old, that the young holothurian becomes free from the egg membrane and creeps out. Thus a free-swimming stage is here entirely lacking. The only other known example of this sort is *Holothuria floridana* as studied by Edwards. The *metadoliolaria* just escaped from the egg membrane has a big hanging preoral hood, five unbranched tentacles and a pair of ventral pedicels.

The preoral hood is gradually absorbed and the animal can now be called the *pentactula.* It creeps about and feeds on detritus found on the bottom of the vessel. The tentacles begin to branch, and new ones appear until the normal number of ten is reached. Ventral pedicels also increase in number, and calcareous deposits, in the form of plates, tables and rods, appear on the walls of body, of tentacles and of pedicels.

In conclusion, the fact is noteworthy that, despite the small size of the egg, no planktonic larval stage appears in this species. On the other hand, some seacucumbers with large yolky eggs, such as *Cucumaria frondosa* (up to 650 μ, Nordgaard), *Psolus phantapus* (600 μ, Runnströms) and *Cucumaria echinata* (440 μ, Ohshima), produce typical free-swimming larvae.

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HETEROPLASTIC GRAFTS OF THE ANTERIOR LIMB-LEVEL OF THE CORD IN AMBLYSTOMA EMBRYOS

THE following is a brief report on the results of some preliminary experiments carried out in the spring of 1924 for the purpose of testing the effect of a foreign source of innervation on the development of the anterior limb-bud of *Amblystoma* embryos. That the anterior limb-rudiment of *Amblystoma* is self-differentiating and, therefore, independent of nervous influence, at least in early stages, is indicated by the work of Harrison and his students. Harrison has replaced the limb-buds from *A. tigrinum* with those of *A. punctatum,* and vice versa, and found that the transplanted limb-rudiment developed very much as it does in its normal location. In the present experiments, the limb-level of the cord in these two species was exchanged, the limb-rudiments remaining in their normal positions. In carrying out the operations, two embryos, one of each species, were arranged side by side and a segment of the cord corresponding to somites 3, 4 and 5 was excised from each and reimplanted in normal orientation in opposite embryos. Sixty-six pairs were operated upon in this manner, the results of which are summarized in the following table:

Series	Operations	Embryos	Stages	Dead at end of seven days	Survivals
I	5	punct.	24	5	0
	5	tigr.	25	5	0
II	16	punct.	21	13	3
	16	tigr.	24	16	0
III	18	punct.	24	15	3
	18	tigr.	26	15	3
IV	12	punct.	23	10	2
	12	tigr.	25	12	0
V	15	punct.	23	15 (1 fixed)	0
	15	tigr.	25	15	0
Total	132			111	11

It will be noted that out of a total of 132 embryos operated only 11 (not counting one fixed) survived the first week, which is always the period of heaviest loss in experiments of this kind. However, the high mortality in this case was due in all probability not so much to the character of the operation as to the fact that the *tigrinum* eggs had to be shipped from Chicago to New Haven, where the experiments were carried out in the Osborn Zoological Laboratory of Yale University. The *punctatum* eggs were collected in the vicinity of New Haven.

The table also shows that the highest percentage of survivals was obtained in Series III, in which Stage 24, for *punctatum,* and Stage 25, for *tigrinum,* were used for operating. This group also proved to be the hardiest and it was possible to carry one of them to metamorphosis.

The eleven embryos surviving the first week were of varying degrees of vitality and all except one were preserved at different times during an eight-week period following operation. One of them, belonging to Series III, a *tigrinum* embryo with a *punctatum* graft, lived to the onset of metamorphosis, as already noted. It reached a length of ten centimeters and seemed to be in vigorous health, but, unfortunately, died during transportation from Woods Hole to New York. However, it was possible to preserve it at once so that it was not a total loss.

Comparison with control animals showed that limb development in operated embryos proceeded in a normal fashion both structurally and functionally, at a somewhat slower rate. So far as the observations go they substantiate the general conclusion reached by Harrison that the anterior limb-rudiment of *Amblystoma* is a self-differentiating system.

FIG. 1

Sectioned embryos show that the transplanted cord unites with the cord of the host and becomes an integral part of the latter's nervous system. Presumably, the nerves forming the brachial plexus and innervating the anterior limb grow out from the transplanted cord segment; but this matter requires more extended study before a definite conclusion can be reached.

A fuller account of this work will be published elsewhere and, in the meantime, more extended experiments will be carried out this spring which, it is hoped, will furnish more abundant material for study.

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CHROMOSOME NUMBERS IN MAMMALS[1]

As my investigations upon the sex chromosomes of mammals have been extended I have had occasion to make diploid chromosome counts in three orders of eutheria which I have not reported on before. In two instances the chromosome numbers reported by earlier investigators have been found erroneous.

Rodents: The rabbit was studied and counts were made on amniotic tissue in both prophase and division phases. The chromosome number for the rabbit was reported to be about 22 by Bachhuber ('16). I find consistently 44 chromosomes in the cells of 8 different embryos. Figure 1 gives the typical appearance of an amnion cell. When the chromosomes of different embryos are paired up, in some individuals all elements have mates of like size and shape, while other embryos have two elements without mates of like size or shape. From this we may conclude that the sex chromosomes of the rabbit are of the X-Y type. A detailed study of the spermatogenesis is now being made.

Edentates: The amnion of armadillo embryos has been studied. The chromosome number for this form had been previously reported as approximately 31 in the male, by Newman and Patterson ('10). I find consistently 60 elements (Fig. 2) in all amnion cells. My investigations on this form have not been carried on far enough as yet to indicate the type of sex chromosome which may be found here.

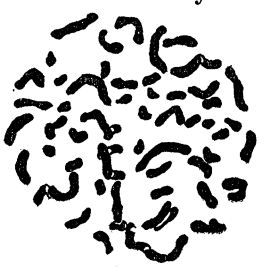

FIG. 2

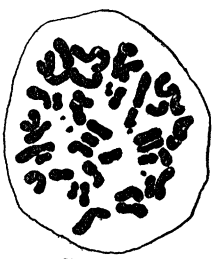

FIG. 3

Insectivors: The spermatogonia of the common European hedgehog has been studied. As Fig. 3 will show there are 48 chromosomes in this animal. This is the first chromosome count to be made on any insectivor, as far as I am aware.

We now know the diploid number of species in seven out of nine eutherian orders, the cetacea and sirenia being the only orders not yet investigated.[2] The chromosome numbers encountered in the species so far studied are as follows:

[1] The writer has been aided in this work by a grant from the Committee for Research on Sex Problems.

[2] For more extensive data concerning the counts given below see bibliography under Painter, 1924, in *Amer. Nat.*, Vol. LVIII, p. 524; Bachhuber, L. J., 1916, *Biol. Bull.*, Vol. 30; Newman and Patterson, 1910, *Jour. Morph.*, Vol. 21.