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Whale anatomy & embryology } marine mammals

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Dr. S. R. Galler  
Office of Naval Research  
Washington 25, D.C.

Dear Doctor Galler:

Following instructions in your letter of April 11 I am sending the following summary of work accomplished and projects in process. The principal objectives have been accomplished.

1. I went to Japan for five months taking my wife with me at my expense. She contributed much toward our good public relations in making contacts and entering into the family life of some of our Japanese friends.
2. We followed two of the Dolphin hunts, which are generally single annual events, arriving in Tokyo within a few hours of the first one.
3. The hunts employ hundreds of men and specialized equipment including many power boats at the beginning of the drive.
4. A special metallic vibrating plate and small hammer are used to produce the short bursts of high pitch by which Dolphins are halted in their migrations up the coast of the Izu peninsula.
5. With a great flurry of noise and beating the waters the power boats drive the massive migration into the harbor at Kawana near Ito. It takes all day to drive them into an inner harbor and hold them with a deep net about 1500 ft. long between piers. 300 were taken the first hunt and a month later an unexpected second drive netted over 600, mostly Stenella, but containing three species.
6. The next morning the crowded and tired Dolphins are collected by broad horizontal nets to special boats that take them to the dock for slaughter in lots of about 25. Killing consists in plunging a long knife into the heart and drawing it back through the abdomen.
7. They are sorted by species and sex and weighed by a beam balance on the shoulders of two men. Each is tagged and recorded. Most are carted away by truck the same day. Viscera are sorted and lungs, liver, heart are separately boxed and sold.
8. With the aid of two members of the Whales Research Institute of Tokyo we selected twenty young females and secured one embryo the first time. This embryo was the smallest cetacean embryo known at that time, and the second embryo secured in like manner a month later. This one is two months old. Both embryos were prepared in serial celloidin sections at the University of Tokyo and were sent to me in Galveston taking a year before they were ready for study.
9. The first embryo 4.2 mm. long has been presented in an atlas of 27 sections. The second one is being studied to reconstruct the organ systems for comparison with a human embryo of similar development. It is evident at this time that comparisons are best made with the pig embryo.

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10. Two conclusions are evident. The reproductive rate of the Dolphin is so low that there is danger of extermination, unless the decreasing numbers make dolphin hunting unprofitable. The two periods of conception, already suggested for the whales, is corroborated for the Dolphin. July and late October are suggested by International Fisheries data. The first embryo taken December 6 is one month old and the second taken January 20 is a little over two months old.

11. The total collection of the Whales Research Institute is small but they have on two occasions given me young embryos. I have one large fetus from Palles Verdes California and two from Rockport Texas. Altogether I have the following materials which I am studying comparatively.

- a. A 4.2 mm. Stenella embryo in transverse series. Atlas published.
- b. A 14 mm. stenella described in detail by Dr. Hosokawa and drawn by me in complete series using camera lucida, at the Univ. of Tokyo.
- c. A 25 mm. stenella in sagittal series of paraffin sections.
- d. A 27 mm. stenella in transverse celloidin series.
- e. A 35 mm. embryo in nearly complete series from two blocks.
- f. A 55 mm. stenella in several blocks some in complete series other in skip series sufficient for my study.
- g. A 73 mm. stenella in skip series from several blocks.
- h. An 85 mm. stenella in skip series.
- i. A 170 mm. stenella not fixed for histological study.
- j. A 375 mm. Tursiops embryo fit only for dissections.
- k. A 1600 mm. fetus already dissected and drawings made.
- l. A 2184 mm. fetus which is being studied for histological detail.
- m. A brain from a young Tursiops being studied from gross sections with microscopic sampling.

12. Using the entire series and often making human comparisons I project:

- a. A study of changing external form and particularly skull growth.
- b. Brain reconstruction to account for tremendous relative enlargement.
- c. The olfactory system which is large in the embryo and disappears.
- d. The anterior cerebral ganglion published for both Dolphin and Man. The origin of this ganglion is still controversial and functions are unknown. However, on the basis of a theoretical guess I predicted a similar pair in the tentorium and located it in a 37 mm. whale in Tokyo. I now want its human equivalent.
- e. The history of the ganglion of the fourth nerve. Published in part.
- f. Peculiarities in the development of the eye and lids. Ciliary ganglion.
- g. Development of the ear and larynx.
- h. The peculiar development of skin and blubber. Pigment distribution.

13. The trip served also to permit some secondary objectives:

- a. Study of microscopic materials at the Univ. of Tokyo.
- b. Study of silver staining methods of Dr. Seto of Sendai and of Dr. Suzuki of Osaka.
- c. It permitted lecture seminars to be given at Tokyo, Sendai, Sapporo, Hirasake, Nagoya, Osaka, Tsu and to several special societies.
- d. The grant also permitted some technical work in Galveston, Texas.

Hopping this will be regarded as Final report I remain.

*John G. Sinclair*  
John G. Sinclair  
Prof. Emeritus of Anatomy

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Galveston

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