this is quite artificial and has no relation to the problem before us. We are interested in the distribution of many measurements of one room, not in the distribution of many measurements of several rooms. Further, with regard to the difficulties with the hypothesis of elementary errors, it certainly is true that elementary errors do exist in some cases. For example, the error made when a long range gun is fired is a function, perhaps approximately linear, of errors made by the gunner, in estimating elevation, direction and force of wind, temperature and composition of powder, etc. We do not wish this hypothesis to be available in all cases of physical measurements, for it is not true that all cases give a normal distribution, and we do not wish to be put in the embarrassing position of having to prove too much. May it not happen that the question of the observance of this law in a given case does in reality depend on the applicability of just this hypothesis?

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SPECIAL ARTICLES

THE OPAH OR MOONFISH, LAMPRIS LUNA, ON THE WEST COAST OF FLORIDA

LATE in July, 1926, one of my former students, Dr. Louise M. Perry, of Asheville, N. C., called at my office and showed me a pencil sketch of a fish which I at once recognized as *Lampris luna*. On showing her the colored figure in Couch's "British Fishes"[1] and reading the description in Jordan and Evermann's "Fishes of North and Middle America,"[2] Dr. Perry declared this to be the fish in question.

This fish came ashore on the bay side of Captiva Island, west shore of Florida, during a heavy southwesterly blow, in the period of full moon during the first week in May, 1926. Dr. Perry has a winter home on the waters of Charlotte Harbor, which is separated from the Gulf of Mexico by Captiva, Sanibel and other islands, and being an ardent fisherman and student of natural history, is particularly on the lookout for unusual specimens. None of the local fishermen on Captiva and Sanibel Islands, the "oldest inhabitant," nor the local taxidermist (who for many years has been mounting specimens for sportsmen in these localities) had any knowledge of the fish. Fortunately Dr. Perry made a careful sketch of the fish and asked for its identification.

This fine specimen was carefully mounted and is in the collection of Dr. Franklin K. Miles, of Fort Myers, Florida. It and the cast in the U. S. National Museum, presently to be referred to, are the only mounted specimens on record in the new world.

Dr. Perry writes that the fish could not have been dead long before she examined it since "the brilliant red and silver of its fins and body were still undimmed." The fish was four feet long between perpendiculars, and weighed 125 pounds. Dissection showed its stomach to be full of the small clam, *Donax variabilis*. Since the opah is commonly reckoned to be a pelagic fish this is very interesting, for it shows that it had been feeding in shallow water—*Donax* being a shallow water dweller. So far as I know there are but two other references to the food of *Lampris*. Cuvier and Valenciennes[3] dissected a two and five tenths foot specimen taken at Marseilles which had in its stomach a large number of the beaks of small cephalopods and also remains of rhizostomous jellyfishes. Later Lowe[4] dissected several Madeiran specimens. In one of these (three feet, four and a half inches long) he found that "the oesophagus was filled with half-decomposed remains of the softer-coated isopodous Crustaceæ (sea woodlice)"; in another (three feet long) "both the oesophagus and stomach were filled with various small soft-coated Crustaceæ, and traces of remains of fish."

This seems to be the fifth recorded opah from the waters of North America. David Starr Jordan, under date of October 26, 1888,[5] reports the capture on the Grand Banks of Newfoundland of a five-foot specimen. This was based on a description and figure sent him by Everett Smith, of Portland, Maine. In *Forest and Stream* (1893, Vol. 41, p. 293), Dr. R. W. Shufeldt records the capture of a specimen on Le Have Bank in latitude 42° 49′ N. and longitude 63° N. This fish was in such fine condition that a cast was made and Shufeldt's article is illustrated by a figure of this fine cast, which shows all the fins covered with dots.

Goode and Bean[6] describe this same fish and figure it without the spots. They say further that "it has been reported from off Newfoundland, Nova Scotia (?), and Maine," but give no records. B. W. Evermann in 1896[7] puts on record a specimen taken at Monterey, California. Jordan and Evermann (1896) describe this Monterey specimen and add that it has been "taken off Newfoundland, Maine, and Cuba, also at Monterey and other places in Califor-

[1] Vol. II, 1863, to face page 133.

[2] Vol. I, 1896, p. 954.

[3] "Histoire Naturelle des Poissons," Vol. 10, 1835, pp. 39–60.

[4] "Fishes of Madeira," London, 1843–60, pp. 27–35.

[5] Bull. U. S. Fish Commission for 1887, 1889, Vol. 7, p. 202.

[6] "Oceanic Ichthyology," 1895, p. 223.

[7] "Recreation," 1896, Vol. 4, p. 41.

nia," but give no specific records. However, they say in a footnote that they had a drawing and description of a specimen taken at Sable Island, off Halifax, in 1846 by James Farquahar. The Florida specimen herein referred to gives a new faunal locality and ties up with its reputed occurrence in Cuban waters. The Cuban record I have been unable to verify. Poey makes no mention of it.

On the other side, it is not particularly uncommon. Lowe noted that it was by no means rare in the markets of Madeira, where it was a much-prized article of food. Cuvier and Valenciennes had specimens from the Mediterranean (as had Risso) and from the Gulf of Gascony. Numerous specimens have come ashore on the coasts of the British Isles, particularly in Scotland, and on the Norwegian coast. Indeed Couch affirms that it was recorded in Norway by Peder Claussen as early as 1632. In the Pacific it has been taken at Honolulu and in Japanese waters in the north and in New Zealand and Australian waters in the south. It seems to be a cosmopolitan pelagic fish, but one more frequently found north of the equator.

It is not remarkable that so striking a fish has been recorded from times relatively far back, and that it has been extensively figured. The earliest figure known to me (and one hardly recognizable) is found in Robert Sibbald's "Scotia Illustrata"[8] and is unaccompanied by any description. Another early figure, and one so well drawn as to be identifiable at a glance, is found in C. Mortimer's article in the Philosophical Transactions for 1750.[9] This fish, which was three feet seven inches long, by three feet ten inches around, weighed eighty-two pounds. It was taken in shallow water at Leith, Scotland, and was sent to Mortimer together with a drawing by Ralph Bigland.

Cuvier and Valenciennes were the first to essay a colored figure.[10] This is not very accurate in the colors, and is apparently very inaccurate in its dorsal and ventral fins which are enormously elongated. Much better is the only other colored figure known to me, that in Couch (2nd ed., 1869, Vol. II, pl. 93). An interesting and probably a fairly accurate figure is that of Lowe's (1843–60, pl. 5) specimen taken off Funchal, Madeira, in 1835. Lowe's description of this specimen (three feet four and five tenths inches long and over sixty pounds in weight) is minute and dependable.

Of western forms we have two figures. Shufeldt's excellent figure, already referred to, shows fins as well as body with spots. Goode and Bean's figure is made from the same specimen but lacks the spots. However, most accurate of all is D. S. Jordan's figure[11] made from an excellent photograph of the largest known specimen (317.5 pounds) taken in the Honolulu fish market. This shows the ventral fins to be wider and less pointed than in any of the other figures (save Shufeldt's) and is particularly interesting in that all the fins, paired and unpaired, are as thickly covered with spots as is the body.

Judging by figures and descriptions there is considerable variation in this fish, which, however, is everywhere much compressed, very deep bodied and remarkably colored.

The family Lampridae is composed of the one genus and species, *Lampris luna*. Several species have been created, but it is generally agreed that all may be reduced to synonymy and that Gmelin's name *luna* applied in 1788 has priority. The affinities of the family are very doubtful. It has been shifted from one order and sub-order to another. Goode and Bean (1895) thought it allied to the Zeidae. Jordan and Evermann thought it akin to the dolphins (Coryphenidae), while Boulenger in the Cambridge Natural History (1904, p. 628) placed it next to the sticklebacks (Gasterosteidae). The latest ichthyologist to attempt to solve this puzzle is Dr. Regan, of the British Museum, who, after a study of the skull of *Lampris*, puts it in a new sub-order, Allotriognathidae. The interested reader will find Regan's article in the Proceedings of the Zoological Society of London, 1907, pp. 634–643. However, it is safe to assume that the systematic position of this rare and little known fish is as yet not fully settled.

The generic name *Lampris* is a Greek word meaning radiant, in allusion to the splendid colors of the fish. The specific name *luna* (moon) refers of course to its rounded form. Another specific name is *guiniensium*. For this and the common names opah and kingfish we are indebted to Mortimer (1750). He related that when the specimen sent to him by Bigland was on exhibition, an African prince from Anamaboe on the coast of Guinea, together with a Mr. Creighton, formerly governor of Cape Coast Castle, saw the fish. They declared that it was found on that coast, where it was called opah by the natives and kingfish by the English.

For an excellent and interesting history of the opah, the reader is referred to the citation from Cuvier and Valenciennes found above.

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[8] Edinburgh, 1684, pl. 6, fig. 3.

[9] Vol. 46, pp. 518–520, plate IV.

[10] 1835, Vol. X, pl. 282.

[11] "Guide to the Study of Fishes," 1905, Vol. I, fig. 199.