

## A NEW SPECIES OF CORMORANT FROM PLIOCENE DEPOSITS NEAR SANTA BARBARA, CALIFORNIA

WITH ONE ILLUSTRATION

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On December 17, 1931, Mr. David Banks Rogers, Curator of the Santa Barbara Museum of Natural History, brought to the writer a well preserved and thoroughly petrified coracoid of a cormorant. This bone was taken about fifty feet from the surface at the Veronica Springs Stone Quarry, near the town of Santa Barbara, California. This quarry is only about a mile from the Victoria Street sand pit in which fragmentary cormorant remains were found in 1930 (Howard, Condor, 33, 1931, pp. 30-31), and, according to Mr. Rogers, there can be no doubt but that it is a continuation of the same Pliocene horizon.

It was immediately evident, upon comparing the fossil coracoid with specimens of Recent *Phalacrocorax auritus*, *P. penicillatus* and *P. pelagicus*, that the bone is larger than in any one of these modern forms. Through the courtesy of Dr. Loye Miller and Dr. Alexander Wetmore the specimen was then compared with *Phalacrocorax femoralis* Miller from the Miocene (or Pliocene?) of Calabasas, and with Recent *P. carbo* and *P. perspicillatus*; and finally it was compared with figured specimens of Pleistocene *P. macropus* (Cope) and Oligocene, Pliocene and Pleistocene species from Europe. These comparisons failed to reveal any form with which the bone from Santa Barbara could be specifically identified, though its size and certain general characters at first suggest similarity with *P. perspicillatus*. Since the coracoids of the North American Oligocene forms, *P. marinavis* Shufeldt and *P. mediterraneus* Shufeldt, are unknown, there was no way to compare these forms. However, there is sufficient geologic time between these and the Santa Barbara bird to justify the assumption that the latter does not belong with either of these species. No coracoid of *P. idahensis* (Marsh) from the Pleistocene of Idaho could be compared, but Shufeldt (Journ. Acad. Nat. Sci. Phila., 9, 1884-1895, p. 401) quotes Cope as saying that it is similar in size to *P. macropus*, the coracoid of which form is considerably larger than the Santa Barbara specimen. There are, of course, several species of living cormorants which are not available for osteological study, but at least the two remaining North American species are smaller birds than that to which the coracoid in question must have belonged. Furthermore, of course, it is not probable that a Pliocene species would have held over into the Recent. The writer, therefore, feels justified in proposing that the coracoid from the Santa Barbara Pliocene be made the type specimen of a new species, that species to be named in honor of Mr. David Banks Rogers whose interest and coöperation have made possible the study of this form.

### *Phalacrocorax rogersi*, new species

*Type specimen*.—A coracoid, number 32.1 in the paleornithological collections of the Santa Barbara Museum of Natural History, collected by Mr. D. B. Rogers, November 30, 1931, from the Pliocene of the Veronica Springs Stone Quarry, Santa Barbara County, California, at a depth of fifty feet from the surface of the deposit.

*Description*.—The bone agrees in size with specimens of *P. perspicillatus* though the shaft is heavier just below the procoracoid and the bone widens more gradually toward the sterno-coracoidal process; though slightly smaller than the specimen of *P. carbo* at hand, the fossil probably falls within the size range of this species as well; the latter, however, is much more slender of shaft in anteroposterior diameter. The fossil is larger than *P. auritus*, *P. penicillatus* or *P. pelagicus*, as well as the Miocene *P. femoralis*. On the other hand it is smaller than the Pleistocene form, *P. macropus*, and therefore judged to be smaller than *P. idahensis* as well. Measurements of *P.*

*rogersi*: Length from head to internal side of distal edge, 76.2 mm.; distance from head to procoracoid, 26.8 mm.; anteroposterior depth through head region, 14.8 mm.; least breadth of shaft below procoracoid, 6.2 mm.; distance of anterior intermuscular line from internal border of bone, 16.8 mm.

It is impossible to determine the exact course of the anterior intermuscular line, upon the character of which Lambrecht (Proc. VIIth International Ornith. Congress at Amsterdam, 1930, pp. 79-81) bases his generic separation of the European fossil cormorants. The erosion which the bone has undergone has almost obliterated the line, though with the aid of a lens it may be observed as a roughened area extending about 24.5 mm. up the shaft from the sternal facet. Whether this represents only a portion of the line, or its full extent, it is not possible to determine. However, regardless of its extent, the degree of curvature immediately above the sternal facet can be observed (fig. 19, *b*) and this is similar to *Phalacrocorax* rather than to any of the other genera into which Lambrecht has divided the fossil forms. The distance from the lowermost point of the intermuscular line to the internal border of the upper lip of the sternal facet is a character which varies considerably throughout the group, though judging from its similarity in *auritus* and *carbo*, as well as in *pelagicus* and *perspicillatus*, it may likely be a subgeneric character. Though the writer can find no mention of the subgeneric affiliations of *P. perspicillatus*, its position in various



Fig. 19. TYPE SPECIMEN OF *Phalacrocorax rogersi*; CORACOID NO. PAL. ORN. 32.1, COLL. SANTA BARBARA MUSEUM OF NATURAL HISTORY: *a*, external view; *b*, anterior view; *c*, internal view; *d*, posterior view. Natural size. Photographs by Mr. H. Wm. Menke.

lists, as well as its external characters, indicates relationship with *pelagicus*. With regard to this distance the fossil is closest to *pelagicus* and *perspicillatus*, but the position of the line above the sternal facet is not exactly duplicated by any species at hand. The following list indicates the ratio of the distance of the intermuscular line from the internal border of the sternal facet relative to the length of the coracoid measured from the head to the internal side of the distal edge of the bone, in certain Recent and fossil forms.

<i>Oligocorax* littoralis</i> (Milne-Edwards) <sup>1</sup>	Oligocene	30%
<i>Oligocorax* mioceanus</i> (Milne-Edwards) <sup>1</sup>	Oligocene	27%
<i>Paracorax* de stefanii</i> (Regalia) <sup>2</sup>	Upper Pliocene	23%
<i>Phalacrocorax rogersi</i> n. sp.	Upper Pliocene	22%
<i>Phalacrocorax perspicillatus</i> <sup>3</sup>	Recent	22%
<i>Phalacrocorax pelagicus</i> <sup>3</sup>	Recent	22%
<i>Phalacrocorax penicillatus</i> <sup>3</sup>	Recent	18-20%
<i>Phalacrocorax</i> sp. (Wildhalm) <sup>2</sup>	Pliocene	18%
<i>Phalacrocorax macropus</i> (Cope) <sup>4</sup>	Pleistocene	16%
<i>Phalacrocorax carbo</i> <sup>3</sup>	Recent	15%
<i>Phalacrocorax auritus</i> <sup>3</sup>	Recent	14-15%

\*Formerly *Phalacrocorax*; separated therefrom on the basis of the character of the intermuscular line (Lambrecht, *loc. cit.*).

<sup>1</sup>Measured from illustrations in Milne-Edwards (*op. cit.*, pl. 43, fig. 5, and pl. 41, fig. 1).

<sup>2</sup>Measured from illustrations in Lambrecht (*op. cit.*, p. 81, figs. 3 and 4).

<sup>3</sup>Measured from Recent specimens.

<sup>4</sup>Measured from illustration in Shufeldt (*op. cit.*, pl. 15, fig. 6).

The region internal to the intermuscular line is slightly depressed or flattened for a greater distance up the shaft of the bone than in any of the modern forms examined, though this condition is approximated in one of the specimens of *perspicillatus* at hand. On the external side the bone slopes steeply outward away from the line in a manner similar to *perspicillatus*.

The anteroexternal portion of the head is thickened; in this character, together with the very slightly depressed neck region, the fossil is closest to *pelagicus*. (See fig. 19, a.)

The internal side of the head above the brachial tuberosity is smoothly rounded as in *pelagicus*, but the brachial tuberosity does not overhang, nor is the area below it depressed (fig. 19, c). In these respects the fossil differs from *pelagicus*; nor is it identical with any of the Recent species, though it perhaps most closely resembles *carbo*; however, even in *carbo* the brachial tuberosity is slightly overhanging, and furthermore, the contour of the head (seen in internal view) is more pointed in *carbo*, so that the resemblance is not marked.

In the region of the procoracoid (see fig. 19, c and d), the fossil is farthest from *penicillatus* and *carbo* and closest to *pelagicus*, though the internal crest appears to have been more prominent than in this latter form. Unfortunately, the bone is slightly broken in this region so that its exact nature cannot be ascertained. It is clear, however, that the body of the bone on the posterior side adjacent to the procoracoid is smoothly convex and is not depressed or flattened as in *penicillatus*, *carbo*, *auritus*, and to a lesser extent *perspicillatus*, and it is even more smoothly rounded than in *pelagicus*.

In view of the presence of this extinct species of cormorant in the Pliocene of Santa Barbara County, the writer would like to withdraw her tentative identification of *Phalacrocorax penicillatus* in the similar deposits at the foot of Victoria Street, based upon a young and partially broken tarsometatarsus. At the time that the tentative identification was made, it was stated (Howard, *op. cit.*, p. 31) that "in anterior aspect the internal border of the shaft appears to project forward more prominently than in the modern species," but that as the bone was broken at this critical point it was impossible to be sure of the accuracy of this observation. The writer feels now that, with the presence of an extinct species established, this apparent difference in the internal border of the shaft of the tarsometatarsus should be considered more seriously. It is, of course, impossible to ascertain whether or not this bone is of the same species as the coracoid described in this paper; it is therefore suggested that the tarsometatarsus be designated simply as *Phalacrocorax* sp.

*Los Angeles Museum, Los Angeles, California, January 28, 1932.*