ON THE SPECIFIC STATUS OF THE KERGUELEN SHAG AND ITS AFFINITIES

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1. SPECIFIC STATUS OF THE KERGUELEN SHAG

The Kerguelen Shag was first described by Cabanis (1875) as a full species, *Phalacrocorax verrucosus*. It was then considered either as a full species related to the Rock Shag *Phalacrocorax magellanicus* (Gmelin) of southern South America (Falla, 1937) or as a mere subspecies of the King Shag *Ph. albiventer* (Lesson), which inhabits southern South America and some subantartic islands (Milon et Jouannin, 1953; Johnson, 1965; Dorst, manuscript) [1].

First it should be emphasised that the Kerguelen Shag is, by its general pattern and more especially by that of its head, a true " Blue-Eyed-Shag." This group comprises two very closely related species, *Ph. atriceps* and *Ph. albiventer,* which are widely distributed in the Subantarctic Region (Murphy, 1936; Falla, 1937; Holgersen, 1945), as well as a third, *Ph. carunculatus* of the New Zealand region. Three other species are usually connected to this group, for, if they are not true " Blue-Eyed Shags," they show close affinities with them. They are *Ph. magellanicus* and *Ph. bougainvillei* of South America (Murphy, 1936) and *Ph. campbelli* of the New Zealand region (Oliver, 1955; Falla, Sibson and Turbott, 1966).

All these species build up a group of Shags of " pan-antarctic origin " (Murphy, 1936; Falla, 1937) which constitutes by now the sub-genus *Leucocarbo* Bonaparte (Dorst, manuscript). It is then inside of this subgenus that the affinities of the Kerguelen Shag are to be found.

Phalacrocorax verrucosus possesses many features which separate it sharply from *all* subspecies of *Ph. albiventer,* the great homogeneity of which has been emphasised by several authors (Falla, 1937; Hlogersen, 1945; Rand, 1954; Oliver, 1955). Some of these features, such as the lack of a white alar bar and certain biological characteristics, were already mentioned by Falla (1937). Comparison of specimens led to the discovery of additional differences between the species:

— The measurements of the length of culmen, tarsus and wing (Figs. 1, 2 and 3 and Table 1) show far lower values in *Ph. verrucosus* than in *Ph. albiventer.* From this point of view the subspecies of the latter are very constant.

— The wing is much more rounded in the Kerguelen Shag; its longer primaries being the 3rd and the 4th, and not the 2nd and 3rd.

— The demarcation line between the white and the dark colours of the head and neck passes much *under* the ear opening and reaches down the sides of the head under the base of the lower mandible.

— The feet of the Kerguelen Shag are heavily stained with dark brown, which sometimes extends so much as to hide their pink

fundamental colour. This feature is unique among Blue-Eyed Shags. Furthermore, the blue ring around the eye is, in life, of a far less bright blue than in *Ph. albiventer.*

— The plumage of immature birds is very different in both species. In *Ph. albiventer,* this plumage is a dull brown-grey on the upperparts and white on the underparts. In *Ph. verrucosus* on the contrary, the immatures show a dark brown plumage on their upperparts, with a bottle-green gloss on the wings and a blue gloss on the back. The region of the thighs is deep black. Furthermore, the immatures of the Kerguelen Shag present a colour dimorphism on their underparts, with a dark and a pale phase. This dimorphism was

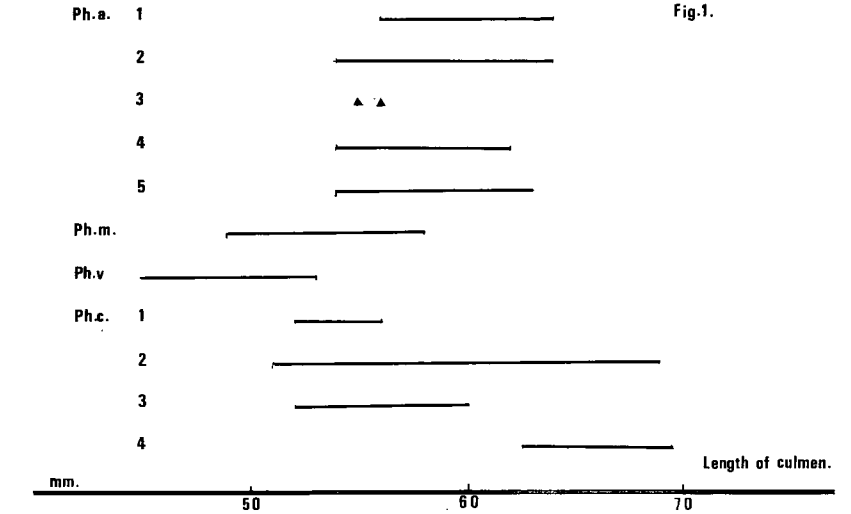

Fig.1.

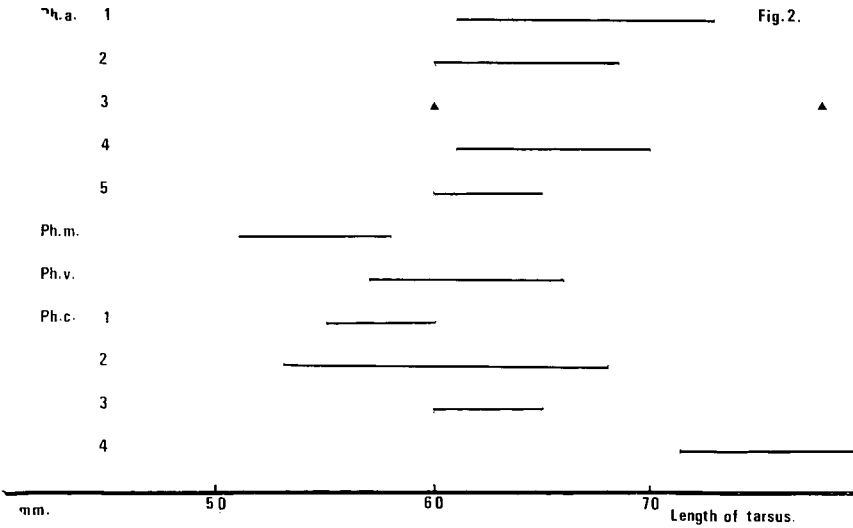

Fig.2.

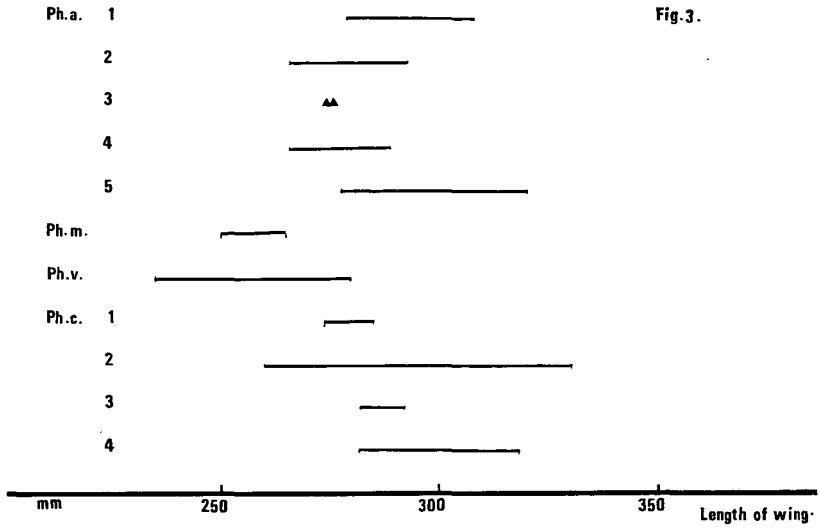

Fig.3.

FIGURES 1, 2 and 3 — Variation Ranges of the Length of Culmen, Tarsus and Wing in four species of Shags.
When no specimen was available, bibliographical data were used.
Symbols: Ph.a.: *Phalacrocorax albiventer.* 1: *Ph. a. albiventer* (Tierra del Fuego, Magellan Strait). 2: *Ph. a. albiventer* (Falkland Islands, Murphy, 1936). 2: *Ph. a. melanogenis* (?) (Marion Island, Rand, 1954). 4: *Ph. a. melanogenis* (Crozet Islands). 5: *Ph. a. purpurascens* (Macquarie Island, Falla, 1937).
Ph.m.: *Phalacrocorax magellanicus* (Tierra del Fuego and Magellan Strait).
Ph.v.: *Phalacrocorax verrucosus* (Kerguelen).
Ph.c.: *Phalacrocorax carunculatus.* 1: *Ph. c. onslowi* (Chatham Islands, Oliver, 1955). 2: *Ph. c. chalconotus* (Southern New Zealand, Oliver, 1955). 3: *Ph. c. ranfurlyi* (Bounty Islands, Oliver, 1955). 4: *Ph. c. carunculatus* (New Zealand, Pr. Kinsky, pers. comm.).

Species and subspecies	N	Culmen	Tarsus	Wing
Ph.albiventer albiventer (Tierra del Fuego and Magellan Strait)	8	(64-56) 61,00	(73-61) 67,37	(308-279) 294,5
Ph.albiventer melanogenis (Crozet Islands)	13	(62-54) 58,52	(70-61) 64,79	(289-266) 273,25
Ph.magellanicus (Tierra del Fuego and Magellan Strait)	9	(58-49) 53,44	(58-51) 55,11	(265-250) 253,22
Ph.verrucosus (Kerguélen)	8	(53-45) 50,00	(66-57) 61,50	(280-245) 260,87
Ph.carunculatus carunculatus (New Zealand, by courtesy of Pr. F.C.KINSKY).	8	(69,6-62,5)66,06	(79,7-71,5)74,75	(318-282) 301,25
	8			

Table 1. Dimensions of culmen, tarsus and wing in four species of Shags. Specimens preserved in the Dominion Museum (New Zealand) and in the Muséum National d'Histoire Naturelle, Paris (France). N = Number of specimens examined.

already mentioned by Falla (1937) and Paulian (1953). The dark-phase immatures are not numerous, and during January, 1967, I saw only a few of them out of several scores of immature birds observed in the region of Port-aux-Francais.

All these characteristics set *Ph. verrucosus* completely apart from all subspecies of *Ph. albiventer*. It seems then logical to consider *Ph. verrucosus* as a full species.

2. AFFINITIES OF THE KERGUELEN SHAG

The features which were enumerated in the preceding paragraph obviously set *Ph. verrucosus* completely apart from *Ph. atriceps* as well. On the other hand, some of them bring it closer to the Rock Shag, *Ph. magellanicus*. Falla (1937) already pointed out their similarities in the coloration of the upperparts and in certain biological features. The coloration of the immatures is very alike in both species, and the dimensions of the adults may be interpreted in the same way (Figs. 1, 2 and 3, Table 1). But it should be noticed that *Ph. magellanicus* differs from all other species of *Leucocarbo* by the pattern of its face and of its throat. On the other hand, immatures of this species are not dimorphic, and get their dark ventral colour nine to ten months after hatching (Murphy, 1936). Furthermore, biological features are no good criterion where allopatric species are concerned, because they can result from a convergence. Consequently, if the Kerguelen Shag is more closely related to the Rock Shag than to *Ph. atriceps* or *Ph. albiventer*, the relationship remains nevertheless remote.

On the other hand, the Kerguelen Shag shows clear affinities with the New Zealand King Shag, *Ph. carunculatus*. The pattern of the bare skin on the face and throat, as well as the pattern of their heads and necks, is very like in both species. The plumage of the upperparts of immature birds is also very alike, and dimorphism does occur as well in the immature as in the adult in *Ph. carunculatus chalconotus* and in *Ph. c. ranfurlyi* (Oliver, 1955; Sibson and Turbott, 1966). Of the four subspecies of *Ph. carunculatus* the nearest to *Ph. verrucosus* is *Ph. c. onslowi*, by its dimensions (Figs. 1, 2 and 3, Table 1) and by the occurrence of a cephalic crest, but it lacks dimorphism. One can see here the difficulties encountered when one wants to place *Ph. verrucosus* closer to one subspecies of *Ph. carunculatus* than to another. The Kerguelen Shag shows in a rather synthetic way characteristics of *all* these subspecies, and may stand near their common ancestor. It should be noted there that *Ph. c. carunculatus* is farthest from *Ph. verrucosus* by its larger dimensions, and by its lack of both crest and dimorphism [1].

It is yet noteworthy that *Ph. carunculatus* has a white alar bar as well as a white scapular and dorsal patch. These features, which show a variable development according to subspecies and specimens, set it closer to *Ph. atriceps* and to *Ph. albiventer* than the Kerguelen Shag.

It is well known that the true "Blue-Eyed Shags" have an austral, circumpolar distribution. If they are considered in the order in which they are encountered moving eastward from Kerguelen, it is possible to observe a gradual change in some of their peculiarities. First, with *Ph. c. carunculatus*, an increase of size is to be noted, as is the appearance of patches of white in the upperparts plumage. The dark blotches on the leg and feet disappear, but may remain on

the sole of the feet and on the joints of the toes. Colour phases are restricted to two subspecies only. Secondly, with *Ph. atriceps* and *Ph. albiventer,* immatures take a dull, grey-brown and white plumage, without any colour phase. The dark colour of the head and neck of adults shows a trend toward surface reduction, and the metallic gloss in the upperpart plumage becomes brighter.

In these conditions, it is likely that *Ph. albiventer* and *Ph. atriceps* have no direct relationships with the Kerguelen Shag, and that the closest relative of this species is at present *Ph. carunculatus.* This was what Cabanis (1875) asserted, without any further comment, in his original description of *Phalacrocorax verrucosus,* the Kerguelen Shag (2).

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