FERTILITY OF HYBRIDS FROM THE COMMON AND CHINESE GOOSE

IN the "Origin of Species" I have given the case, on the excellent authority of Mr. Eyton, of hybrids from the common and Chinese goose (*Anser cygnoides*) being quite fertile *inter se;* and this is the most remarkable fact as yet recorded with respect to the fertility of hybrids, for many persons feel sceptical about the hare and the rabbit. I was therefore glad to have the opportunity of repeating the trial, through the kindness of the Rev. Dr. Goodacre, who gave me a brother and sister hybrid from the same hatch. A union between these birds was therefore a shade closer than that made by Mr. Eyton, who coupled a brother and sister from different hatches. As there were tame geese at a neighbouring farm-house, and as my birds were apt to wander, they were confined in a large cage; but we found out after a time that a daily visit to a pond (during which time they were watched) was indispensable for the fertilisation of the eggs. The result was that three birds were hatched from the first set of eggs; two others were fully formed, but did not succeed in breaking through the shell; and the remaining first-laid eggs were unfertilised. From a second lot of eggs two birds were hatched. I should have thought that this small number of only five birds reared alive indicated some degree of infertility in the parents, had not Mr. Eyton reared eight hybrids from one set of eggs. My small success may perhaps be attributed in part to the confinement of the parents and their very close relationship. The five hybrids, grandchildren of the pure parents, were extremely fine birds, and resembled in every detail their hybrid parents. It appeared superfluous to test the fertility of these hybrids with either pure species, as this had been done by Dr. Goodacre; and every possible gradation between them may be commonly seen, according to Mr. Blyth and Capt. Hutton in India, and occasionally in England.

The fact of these two species of geese breeding so freely together is remarkable from their distinctness, which has led some ornithologists to place them in separate genera or sub-genera. The Chinese goose differs conspicuously from the common goose in the knob at the base of the beak, which affects the shape of the skull; in the very long neck with a stripe of dark feathers running down it; in the number of the sacral vertebræ; in the proportions of the sternum;[1] markedly in the voice or "resonant trumpeting," and, according to Mr. Dixon,[2] in the period of incubation, though this has been denied by others. In the wild state the two species inhabit different regions.[3] I am aware that Dr. Goodacre is inclined to believe that *Anser cygnoides* is only a variety of the common goose raised under domestication. He shows that in all the above indicated characters, parallel or almost parallel variations have arisen with other animals under domestication. But it would, I believe, be quite impossible to find so many *concurrent and constant* points of difference as the above, between any two domesticated varieties of the same species. If these two species are classed as varieties, so might the horse and ass, or the hare and rabbit.

The fertility of the hybrids in the present case probably depends to a limited degree (1) on the reproductive power of all the Anatidæ being very little affected by changed conditions, and (2) on both species having been long domesticated. For the view propounded by Pallas, that domestication tends to eliminate the almost universal sterility of species when intercrossed, becomes the more probable the more we learn about the history and multiple origin of most of our domesticated animals. This view, in so far as it can be trusted, removes a difficulty in the acceptance of the descent-theory, for it shows that mutual sterility is no safe and immutable criterion of specific difference. We have, however, much better evidence on this head, in the fact of two individuals of the same form of heterostyled plants, which belong to the same species as certainly as do two individuals of any species, yielding when crossed fewer seeds than the normal number, and the plants raised from such seeds being, in the case of *Lythrum salicaria*, as sterile as are the most sterile hybrids.

Down, December 15 CHARLES DARWIN

[1] Charlesworth's "Mag. of Nat. Hist.," vol. iv., new series, 1840, p. 90. T. C. Eyton, "Remarks on the Skeletons of the Common and Chinese Goose."

[2] "Ornamental and Domestic Poultry," 1848, p. 85.

[3] Dr. L. v. Schrenck's "Reisen und Forschungen im Amur-Land,' B. i. p. 457.

CLOUD CLASSIFICATION[1]

THE work of a meteorologist who has devoted himself with great diligence for many years to the study of the structure, forms, and movements of the clouds, possesses a strong claim on the attention of all who are interested in this difficult branch of science. Independently of the importance of the challenge which Prof. Poëy offers to an existing system of nomenclature, his book contains numerous facts and suggestions of very considerable scientific value. In the present enlarged and revised edition the author has endeavoured to satisfy the requirements of our advancing knowledge on the subject of which he treats; a task which ought, unfortunately, to be one of no great difficulty, owing to the small amount of progress which has been made in this, as compared with other departments of meteorology, since the appearance of the second edition.

The history of cloud-nomenclature has been to a great extent a record of wrecks and casualties, because classification has, by an unfortunate necessity, preceded the knowledge of the physical structure of the objects classified. Prof. Poëy was one of the first to appreciate the importance of the fact that the terminology of the clouds must, ultimately, be based not simply upon the varieties of the forms of clouds, but upon those physical conditions to which these varieties are related. But our knowledge of the physical conditions which determine the development of the modifications of cloud is at the present time so limited that no classification founded thereon can as yet be unreservedly adopted. A great deal of questionable hypothesis necessarily enters into the construction of Prof. Poëy's scheme, as he would, we believe, with the candour which distinguishes him, be the first to admit. There is of course a strong *prima facie* desirability that cloud observers should possess some definite system of nomenclature; and at present nearly all of them, not of the lazy class, complain that cloud-classification is still in a state of chaos. Yet it may be doubted whether, for some years to come, a Meteorological Congress will be able to establish an absolutely fixed system of classification which will be universally accepted. Of the ground on which such a system should be built science has hitherto explored but a small portion: and even where we have the materials for observational and experimental research in this direction, very inadequate use has been made of these materials. The immediately practical problem which is raised by the study of this book is this:—In the provisional adaptation of our cloud classification to the status of our knowledge, is it desirable that Prof. Poëy's terminology be adopted in lieu of that of Howard, or should the still prevailing nomenclature be retained, with such modifications as the observations of Poëy and of other students of the subject have as yet shown to be necessary? To this problem we shall venture in the present article to suggest an answer.

As might be expected from the condition of the subject the critical portion of Prof. Poëy's treatise is more successful than the constructive. Several of Howard's terms have had from the first an ill-fated career. To

[1] "Comment on observe les Nuages pour prevoir le Temps." Par André Poëy. Third Edition. (Paris: Gauthier-Villars, 1879.)