THE BIRDS OF THE GENUS CINCLUS AND THEIR GEOGRAPHICAL DISTRIBUTION

By LEONHARD STEJNEGER

The dipper has always occupied a prominent place in my affection; he was one of the earliest bird friends of my boyhood. Almost as far back as I can remember that cheerful fellow reared his young less than two hundred yards from the house where we used to spend the summers. The dipper's nest was the first bird nest I ever discovered. It was placed under an old stone bridge across a rushing mountain stream where we bathed and fished, just high enough to be out of my youthful reach. The dipper was also the first bird I drew and painted from nature, and curiously enough, when the question as to the various races of the European species arose more than thirty-five years ago, and old Professor Jean Cabanis asked me to get him a specimen for the Berlin Museum, the dipper's was the first bird skin I ever attempted.

Later the highly peculiar and aberrant morphological characteristics of the genus *Cinclus* attracted my attention. As an oscinine bird with the downy covering and diving faculty of a water bird, the dipper certainly is an anomaly, and the various positions given to the genus by the bird classifiers attest how puzzling its relationships are. Even at this late day there is no absolute certainty as to its most intimate affinity. We need not worry about the alleged proximity to such birds as the Motacillidæ, on the one hand, or *Seiurus,* on the other. The timaliine similarities sometimes hinted at may also be dismissed with a light heart. The majority of ornithologists of to-day divide upon the question whether the dipper is more closely allied to the thrushes (Turdidæ in the wider sense) or to the wrens. Twenty years ago I inclined in the latter direction and wrote (Standard Nat. Hist., IV, Birds, 1885, p. 505) that the dipper "in appearance, movements, nest-building, etc., is a gigantic wren." It is certainly true that in these particulars it resembles the wrens sufficiently to make that particular view a tempting one, but on reconsidering the structure I am coming back to Professor Baird's dictum that the "Turdidæ, Saxicolidæ, and Cinclidæ are all closely related to each other by the presence of common characters" (Review Amer. Birds, I, 1864, p. 1). It is well to remember in this connection that Professor Baird placed *Sialia* in the Saxi-

colidæ, and that in my Remarks on the Systematic Arrangement of the American Turdidæ (Proc. U. S. Nat. Mus., v, 1882, pp. 449–483) I included the Turdeæ, the Saxicoleæ, and the Sialieæ in the same subfamily, Turdinæ. As for the "character which really indicates the relationship of the birds to be included in this family" [Turdidæ] I stated that "the peculiar spotted first plumage of the Turdidæ is a very striking feature, and its coincidence with booted tarsi very remarkable" (*op. cit.*, p. 450). At the time of writing that sentence I was unacquainted with the real primitive style of young plumage which is only shown by some of the Asiatic dippers.

In recent years the problems involved in the geographical distribution of the dippers has again turned my attention to that fascinating group. Its geographical range is certainly quite remarkable. In the Palearctic region—or subregion, if you please—the dippers flourish in most of the high mountain systems, from the Atlantic to the Pacific, and northward it extends into the Arctic life zone whenever mountain chains lead the way. In the New World, however, the dippers are confined to the boreal zone of the long Cordilleran chain from Alaska to the Argentine Republic. They are unknown in Greenland, Labrador, and the whole eastern mountain system. Nor are dippers known from any other mountains in South America but the Andes.

In this connection I have another recantation to make. Owing to our former lack of specimens of the east Asiatic dippers in the first plumage alluded to above I assumed that the white underside of *Cinclus leucogaster* and of the South American species *C. leuconotus* were not only parallel developments, but that the latter represented the primary young plumage which I thought I recognized in the first plumage of *Cinclus cinclus*. In 1885, therefore, I concluded "that the neotropical forms are most like the ancestral stock" and "that South America is the cradle of the genus" (*op. cit.*, p. 505). But as it now turns out, nothing could have been more fallacious.

Since those early days I have seen the young of *Cinclus asiaticus* and *C. pallasii*. They are typically turdine! Both are startlingly like enormous, overgrown fledglings of *Sialia* except that they do not have the blue color on tail and wing-feathers. The first mentioned has all the feathers white with a broad dusky margin giving the whole plumage a distinctly squamate appearance, and the second has the light centers of the feathers of the upper surface suffused with brownish. The combination of the thrush-like spotting with the booted tarsi is complete! Nor is the fledgling plumage of the wheatear (*Saxicola*) very different, except for the white on rump

and tail, but these features are plainly secondary developments. The similarity of these young birds is so great that added to the many structural characters pointed out by Professor Baird I am convinced that *Cinclus* has sprung from the same root as the other two, and that its many peculiarities are mere adaptations to its aquatic habits. Even the curious "dipping" motion which in a great measure has helped to associate it in our minds with the wrens, connects it equally well with the Saxicolas.

The latter are exclusively Old World birds except the typical species *Saxicola oenanthe* which I have shown to be a comparatively recent immigrant into this continent (Proc. U. S. Nat. Mus., XXIII, 1901, pp. 473–481). The blue-birds, *Sialia*, on the other hand, are North American. While it is true that they follow the elevated regions down to the isthmus of Panama, it is also true that they have no Neotropical relatives, that they belong to the birds characteristic of the Nearctic region—or subregion! Sharpe has recently affirmed that the beautiful Himalayan bluebird, *Grandala cœlicolor*, tested by the characters I have given for the Turdidæ, "shows great affinity to *Sialia*" (Hand-list Birds, IV, 1903, p. 184), and he even enumerates it between the two nearctic genera *Sialia* and *Ridgwayia* in order to express this close affinity.[1] Sharpe also places the genus *Catharus* in close proximity to the bluebirds. This genus inhabits the elevated portions of Mexico and Central America south into northern South America along the Andes as far as Peru. Nevertheless, it is not a neotropical genus; its affinities are distinctly holarctic whether we adopt Dr. Sharpe's view that they belong to the Sialieæ or mine (Proc. U. S. Nat. Mus., V, 1882, p. 467), that they are part of the same group which includes the Old World nightingales, blue-throats, etc., viz., the Luscinieæ.

Bearing these facts in mind I have therefore no hesitation in affirming that *Cinclus* is of palearctic origin.[2] It remains only to fix upon a more restricted and definite region as its probable original starting point.[3]

[1] Seebohm even placed *Grandala* in the genus *Sialia*.

[2] It will be seen that on the whole I agree with Seebohm, Brit. Birds' Eggs, I, 1883, p. 253, and Scharff, Hist. Europ. Fauna, 1899, p. 255.

[3] It may help to understand the following better if I give a condensed synopsis of the various forms (31) now recognized by advanced ornithologists. No attempt has been made to subordinate them, and their unit names are enumerated chronologically in each main group.

Genus *Cinclus* BORKHAUSEN, 1797

a[1] Coloration of young more or less squamate (Old World).

b[1] Color of adults more or less uniformly fuscous.

Among the Asiatic dippers there appear to be two fairly distinct types, one uniformly dusky when adult and strongly squamate above and below when young, exemplified by *Cinclus pallasii,* and one with some of the underparts pure white, when adult, and with the squamation less pronounced in the young, exemplified by *C. cashmeriensis.* Both of these types meet in the eastern Himalayas radiating thence east, north and west, the uniformly colored forms more easterly, the pied forms more westerly. There will probably be few dissenting voices among those who have followed me thus far, if I designate that enormous and ancient plateau and mountain region north of India and east of the 90° east longitude (including the "Manchurian coign" of the geomorphists, Suess's Eurasian "Scheitel") as the region where the genus *Cinclus* originated. From this center the dippers radiated wherever high enough mountain ranges, or otherwise boreal conditions, permitted them to push forward their colonies.

C. pallasii Temminck, 1815: East Siberia, China, Japan, south to Assam; *asiaticus* Gray, 1846: Assam to Turkestan; *sordidus* Gould, 1859: Himalayas, North Tibet, Northwestern China; *marila* Swinhoe, 1859: Formosa; *soulici* Oustalet, 1892: Tibet; *bilkevitchi* Zarudny, 1902: Altai Mts.; *sicmsseni* Martens, 1903: Fokien, China; *kiborti* Madarász, 1903: Krasnoyarsk, Siberia; *middendorffi* Sushkin, 1904: Sayan Mts., Siberia.

b^2 Color of adults more or less white on underside.

C. cinclus (Linnæus) 1758: Scandinavian peninsula; *merula* (Schæffer) 1789: Central Europe; *gularis* (Latham) 1801: Great Britain; *albicollis* (Vieillot) 1816: Southern Europe; *syriacus* Gloger, 1833: Syria; *leucogaster* Bonaparte, 1850: from Turkestan eastwards; *cashmeriensis* Gould, 1859: Himalaya Mts. westwards; *minor* Tristram, 1859: Atlas Mts.; *pyrenaicus* Dresser, 1892: Pyrenees; *baicalensis* Dresser, 1892: eastern Siberia; *saturatus* Dresser, 1895: Baical; *olympicus* Madarász, 1903: Cyprus; *caucasicus* Madarász, 1903: Caucasus; *sardus* Hartert, 1904: Sardinia (and Corsica?); *bianchii* Sushkin, 1904: Sayan Mts., Siberia.

a^2 Coloration of young not squamate, more or less like adults (New World).

b^1 Coloration more or less uniform grayish, without white patch on underside of wing (North America).

C. mexicanus Swainson, 1827: Mexico and Guatemala; *unicolor* Bonaparte, 1827: Western North America north of Mexico; *ardesiacus* Salvin, 1867: Central America.

b^2 Coloration in vari-colored patches; a white patch on underside of wing (South America).

c^1 Color more or less fuscous with white head.

C. leucocephalus Tschudi, 1844: Bolivia and Peru; *leuconotus* Sclater, 1857: Venezuela, Colombia and Equador; *rivularis* Bangs, 1899: Colombia.

c^2 Color gray with a rufous throat patch.

C. schulzi Cabanis, 1882: Argentina.

Without paleontologic evidence it would be impossible to say with any degree of approximation when this radiation took place, and there is but slim chance that we shall ever have such evidence. However, the indications are that so deep-seated modifications as we have seen that the dippers have undergone, as well as others to be mentioned later on, must have required a comparatively long time for their accomplishment. If I were to make a guess, I should place the origin and beginning of the dispersal of the dippers not later than the dawn of the Tertiary.

Geologists and bio-geographers seem pretty well agreed that at that time the eastern portion of Asia and North America were connected by a land bridge somewhere about Bering Sea, and that a great uplift took place which was the beginning of the mountain ranges which from Alaska southward parallel our Pacific coast. In eastern Asia similar ranges stretch out from the elevated region alluded to above northeastward towards Bering Sea. Along this route it would not have been difficult for the ancestor of our *Cinclus unicolor* to have found his way into western North America.

Before proceeding further it may be well to remark that the ancestral dipper must have been in every respect, both as to structure and to habits, a typical *Cinclus*. Before he left the original home he must have acquired all the peculiarities so characteristic of the genus, since in all these details the most remotely located members of the group are essentially a unit. The species rearing its young on the confines of Patagonia in nearly all particulars, except color, conforms with the one "dipping" on the snow-fells of far away Scandinavia.

All these structural peculiarities and the habits of the bird are strictly interrelated. In other words, as the ancestral dipper had the essential structure of the dippers of to-day, so he also had their habits, and as these again interact with the conditions of life and surroundings, so the ancestral dipper must have inhabited the same life-zone as its descendants. From the latter we are therefore justified in concluding backwards as to the conditions under which the ancestor lived. As the dipper lives to-day so he lived in Miocene times.

It cannot be the purpose in this connection to give an extended account of the interesting habits of these birds, but sufficient should be said to fully explain the conditions necessary to enable the dippers to emigrate into distant lands.

The dipper breeds in the upper portion of the boreal zone, extending upwards or northwards into the arctic-alpine zone, in closest proximity to cold rushing mountain streams. These he follows some

distance down into the lower boreal zone, provided the short summer is not too intensely hot. In winter he does not migrate in the regular sense of the word, no matter how cold it is, provided the streams do not freeze over completely. Where they do that he is obliged to go south or down some little distance until he strikes open water, and when once on the move some individual may go astray possibly a few hundred miles, but rarely far away from snow and ice if he can help it. But it is the mountain torrent with its teeming life he loves, and he abhors the sluggish flow of the water courses of the boggy or heavily timbered plains. In this peculiarity we must seek the explanation of the fact that the dipper has never crossed our continent and that the streams of Labrador and the Appalachian mountains do not know him.

It is then evident that in order to emigrate from the plateau of Asia to Alaska there must have been a continuous boreo-arctic life zone occupying a portion, at least, of the hypothetical land bridge across Bering Sea, and this life zone must have furnished in addition the special conditions suited to the dippers' requirements. This life zone stretches across to-day, but the question is whether the climate in Eocene or early Miocene times would not be an insurmountable obstacle in the dipper's way. We have all been told that during that period of the earth's development the climate was much milder than to-day, and moreover, this same land bridge is supposed to have been used by many other animals, inhabitants of a warmer zone than the one to which the dipper is restricted. If therefore this was his route of emigration we must suppose that the land bridge in question possessed a sufficient elevation to provide a suitably cool climate in its higher altitudes. This is a question for the geologists to decide.

That the dipper once on Alaskan soil found mountains sufficiently elevated to suit his tastes is less problematical, and when the uplift of the various systems which go to make up the long chain from Alaska to Patagonia reached its highest limit a continuous boreal life zone doubtless facilitated his march southwards.

In its new home the dipper apparently flourished. Probably the new conditions stimulated development in the direction which seems inherent in nearly all birds, viz., a tendency to assume a more uniformly colored plumage which in time leads to the obliteration of the originally striped or spotted plumage of the young. So the American dippers lost the peculiarly squamated appearance of the Old World cousins and the young became essentially like the adults.[1]

[1] So far as I know, the fledgling plumage of the various South American species is unknown. There are indications, however, that it is not squamated

The geologists tell us that during the lower Tertiary a wide sea rolled across what is now the isthmus of Panama. Until the land rose and joined the two continents the dipper could not pass into South America. However, the connection was made early enough for our purposes and the dipper had probably gained a foothold in the Andes before the advent of the Pliocene.

The specialization begun in North America continued under the southern sky. The large white patch on the underside of the wing is a common birthmark of all the South American species of dippers and proves them all to have descended from a single stock which acquired this character probably shortly after the arrival in South America. Other differentiations in plumage took place aided by more perfect isolation of the various colonies on the boreal islands of an otherwise tropical mountain system than could take place in more northern latitudes. The dipper which reached farthest south (*Cinclus schulzi*) seems to have become most modified, for it has acquired a light rufous throat, a character entirely unique in the genus.

Let us now return to the supposed original home of the dippers in the Chinese mountain. As already stated (p. 424) we have two separate types there, one uniformly fuscous, the other pied, white and dusky. The uniform dark style seems to be the older which preoccupied the mountains of the old land mass to the northeast and east extending as far as Formosa, Japan, and the Stanovoi mountains[1] for an unknown distance. Local influences in connection with more or less imperfect isolation have carved out a number of races such as *C. asiaticus* in the Himalayas, *C. pallasii* in eastern Siberia, Japan, etc., *C. marila* in Formosa, *C. sicmsseni* in the province of Fokien, China, *C. soulici* in Tibet, *C. bilkevitchi,* in the Altai Mountains, etc., etc., but with a more or less uniformly colored bird to work upon the variation could not be so very great, and some of these races must be very difficult to distinguish.

The pied style, as exemplified by the common European dipper, probably came into being somewhat later when the western mountain ranges rose up out of the Miocene Sea. According to the rules of zoological nomenclature, which now govern our scientific terminology, the name *Cinclus cinclus* (Linnæus) is that of the "species" and those forms which have been described later are "sub-species," as for instance, *C. cinclus cashmericnsis.* But it is more likely that

[1] By this name is meant the various mountain systems extending in a northeasterly direction from the great bend of the Amur river and forming the watershed between the Arctic and the Pacific Oceans.

it is one of the Asiatic species named much later, which represents the original stock, and that the form to which Linnæus gave the name is the real sub-species. As the land rose to the westward the dippers expanded their range and entered southeastern Europe by way of Asia Minor. One branch apparently continued southwestward and eventually reached the Atlas Mountains in northwestern Africa sending side shoots northward across an ancient land bridge to Sardinia and Corsica. Probably to this branch also belongs the form inhabiting the upper levels of the Pyrenees, as the three forms *C. minor,* from the Atlas, *C. sardus* from the island of Sardinia, and *C. pyrenaicus* are said to be very closely allied. A more northwesterly direction was taken by another branch which eventually reached Central Europe.

Whether the forms which now inhabit Great Britain (*C. gularis*) and the Scandinavian peninsula (*C. cinclus*) belong to the first or to the second branch it is impossible to say at present. It may even be that both branches are represented. The fact is that notwithstanding the great splitting up of *C. cinclus* by European ornithologists lately, there is as yet not sufficient material brought together for a satisfactory solution of the question of the geographical distribution of the dippers in Europe. In a half-hearted, slip-shod way it has been more or less generally accepted that the Scandinavian dipper forms a separable race, by some called *C. cinclus,* by others *C. melanogaster,* but the whole business is so muddled with references to *C. melanogaster* occurring in Ireland, the Pyrenees, Switzerland, Corsica, Caucasus, etc., etc., that all sense has been lost. It is not possible, without a larger material collected systematically for the purpose, to do more than to indicate certain lines of connection in the most timid and tentative way. The fact that the Atlas, Sardinian and Pyrenean as well as some Swiss specimens have been referred to the black-bellied Scandinavian form suggests the possibility of their being related. The records from the British islands do not throw much light upon the subject, for the English ornithologists have given very little attention to the minute relationships of their native birds.[1] A black-bellied dipper has been recorded from Ireland, however, and it is not beyond the possibilities that some of the winter birds of so-called *C. melanogaster* from various points in eastern Great Britain are visitors, not from Norway, as suggested, but from some breeding place in Great Britain itself. The typically

[1] The sarcastic remarks by the reviewer in the "Ibis" (1902, p. 353) of von Tschusi's "feat" in recognizing the British dipper by a subspecific name are quite amusing, but scarcely in the sense intended by him!

black-bellied Scandinavian dipper as found in western Norway might then be suspected of having reached its present home from the west, in which case we would have a most striking parallel to the case of the small race of red deer in western Norway, with apparent relatives in North Africa, Sardinia and Scotland.[1] The suggestion that even the Scandinavian dipper is of double origin (also parallel with the red deer) is borne out to some extent by Professor Robert Collett's record of some specimens from the neighborhood of Kristiania, Norway, which seem to come pretty close to the Central European *C. merula* (Nyt Mag. Naturvid., XXIII, pt. iv, 1877, p. 105). On the other hand, I would call attention to the fact that von Tschusi-Schmidhoffen at the time he diagnosed the British dipper as *Cinclus cinclus britannicus*[2] indicated certain similarities to the typical *C. cinclus*. A great obstacle to a correct appreciation of the relationship of the dippers in Europe is the insufficiency of our knowledge of their distribution in Russia. We do not even approximately know the affinities of the dippers which occur in the Ural Mountains.

It is not even certain that the uniformly dark East Asiatic type is trenchantly distinct from the pied one. Two forms have been described, viz., *C. saturatus* Dresser, from the Baical region, and *C. middendorffi* Sushkin, from the neighboring Sayan Mountains (if these are not identical) which seem to be somewhat intermediate. In that same general region we have a number of other forms, more or less closely allied, yet showing such extremes as *C. leucogaster* with entirely white underside and *C. pallasii*, uniformly dusky above and below, so that one is almost tempted to regard those mountain systems (Suess's "alter Scheitel") as the original radiation center, though the truth may be that the various types in their wanderings have crossed each others' ways just here.

Various authors, for instance Taczanowski, have suggested that some of these intermediate forms are the result of hybridization. While such an assumption might account for certain individual specimens, it does not explain the whole situation. I may here call attention to the fact that nearly all the material, upon which they have based their conclusion, consists of winter specimens which may

[1] See Stejneger, *Amer. Natural.*, XXXV, Feb., 1901, pp. 110–111.

[2] *Ornith. Jahrb.*, XIII, 1902, p. 69. It would seem as if Latham's name *Turdus gularis* (1801) must stand for the British bird, as it is specifically based upon a specimen from Penrith. Moreover, von Tschusi is not the first author to recognize the British bird as distinct and give it a name. That was done in 1890, by Léon Olph-Galliard, Contrib. Faune Ornith. Europe Occid., fasc. XXX, p. 12.

have come together from the most different mountain systems bordering the Irkutsk Amphitheater and Lake Baikal, and that the dippers *nesting* in each of these mountains, such as the Sayan, the Primorski Khrebet, and the Vitim plateau, not to speak of others more remote, differ more or less appreciably from each other.

All these questions are of the utmost importance and interest, but with the present utterly inadequate material at the disposition of the ornithologists, it is scarcely possible to more than lift a corner of the veil. Until the true inter-relations of these birds have been ascertained; until the distribution of the forms thus established has been actually mapped in considerable detail; and until the results thus gained have been verified by correlation with the physiographic features of the country in the field by competent observers; until then we shall have nothing but guesses.

The story of the dippers is not an isolated instance. It is, on the contrary, a typical example of the status of a vast majority of the holarctic animals whose geographical distribution is of the utmost importance for a correct understanding of all the phenomena involved. It will require a wisely planned and carefully conducted biological survey with ample means at its command and a central depository for the vast material which must be gathered by specially trained field agents before the many problems I have only hinted at can be rationally approached. The necessity of attacking the proposition in some such way may be further inferred from another example furnished by the dippers. I need only mention that no less than nine different forms of palearctic dippers have been described during the last two years, the scant material upon which these are mostly founded being distributed among six different museums.