Lymnæids by the characters of the shell, genitalia (shape of prostate, relative size and form of the penis and penis-sac) and radula.''

On a basis of these criteria he has split the genus *Lymnæa,* as defined by Haldeman, 1840, Gould, Binney, 1868; Dall, 1871; Tryon, 1872 and 1884, and more recently by Dall in 1905, into six genera: *Lymnæa, Pseudosuccinea, Radix, Bulimnæa, Acella* and *Galba.* He has done this mainly by raising a number of subgenera and sections of former authors to generic rank. I wish to ask this question: Is this at the present time justifiable? (1) Baker lists 103 species and varieties of the old *Lymnæa* in this work. Of but 33 have anything of the anatomy, radula and genital organs been studied. Therefore the shell characteristics are the important ones after all. (2) All these new genera are based largely on quantitative characters. The only qualitative character mentioned is the radula and this is given quite a subordinate place in the classification. (3) In his diagnosis of the genus *Galba* in his key he states that the ''Penis'' (epiphallus) is shorter than the ''penis-sac'' (penis). However, for two of the species of this genus the epiphallus is longer than the penis. (See Baker, pp. 263 and 277.)

In the mind of the writer our present knowledge will not allow us to make a comprehensive classification of the Lymnæids based on the anatomy of the snail. We know too few species well. On the other hand, the shell characters alone in a mollusk with such a generalized form of shell as have the Lymnæids are not characters on which one can base much reliance. On account of these reasons the writer would make the recommendation that the old genus *Lymnæa* should be retained in the sense that it has been used for the past seventy years.

In the *Nautilus* for June, 1915, Mr. F. C. Baker answered the writer in an article entitled "On the Classification of Lymnæids." I think this may be taken as the typical attitude of a taxonomist. He said:

> The writer can by no means agree with the statement made twice in this paper (*loc. cit.*) that generic names should not be added unless based on undebatable grounds, because of the inconvenience of the cataloguer. If this criticism should be recognized we should revert to the use of many of the older names in the Pulmonata as well as in the Naides.
>
> It is recognized, of course, that generic subdivisions can be overdone, but in the advancement of science the convenience of the cataloguer or teacher is not considered.

We welcome all additions to knowledge and we know full well that the work of yesterday is rendered obsolete by the work of to-morrow, but the writer can not see how the reduction to subgenera and sections of the names used as genera and subgenera in the monograph in question advances our knowledge of the family any more than the raising of a number of subgenera and sections to generic rank, as Colton believes the writer to have done in his monograph. This rather resembles a game of see-saw.

This whole discussion hangs on the question, is it necessary to change generic names to advance our knowledge? The writer believes that to change generic names without an overwhelming amount of evidence in favor of the change is hindering instead of advancing science. Species and minor groups, on the other hand, can not be too much subdivided. It is an advance to describe every variation that can be distinguished. Of this work Bateson[2] says:

> They will serve science best by giving names freely and by describing everything to which their successors may possibly want to refer, and generally by subdividing their material into as many species as they can induce any responsible society or journal to publish.

In conclusion, generic names are those by which animals are catalogued, therefore should not be changed without overwhelming evidence in favor of the change. This value of the generic name has not been sufficiently emphasized.

Harold S. Colton
Zoological Laboratory,
University of Pennsylvania

The End of Cory's Shearwater

Cory's shearwater (*Puffinus borealis*) does not exist. It seems a pity to abolish so time-honored and respected a species; but the truth is that it already stands abolished, and nothing is required but the awakening of us American bird-men to the fact. It is indeed a token of provincialism on our parts that this remarkable error should have gone for thirty-four

[2] ''Problems of Genetics,'' p. 249.

years uncorrected. For Cory's shearwater, described in 1881, was not a new bird, but an old bird with a new name. Its range is not unknown, and its nesting-habits and eggs have long been familiar to naturalists. As I have for some time suspected, as Howard Saunders stated positively away back in 1889, and as Godman in his "Monograph of the Petrels" (pp. 94–98, Part II., 1908) has established, *Puffinus borealis* is a synonym of *Puffinus kuhli,* the Mediterranean great shearwater, a common Old World bird which has been well known for generations.

My first intimation of this fact I found in Howard Saunders's "Manual of British Birds," wherein, on p. 716 (first edition), in treating of the great shearwater, he remarks:

> In the Azores, as well as on the islets near Madeira and the Canaries, the resident species is *P. kuhli* (identical with *P. borealis* of Cory), which visits the western coasts of France and the Peninsula, and is abundant throughout the Mediterranean; the latter species is of a much paler brown on the upper parts, and has a yellow-colored and deeper bill.

This was startling, since I knew that Saunders was not a man for unguarded statements; but at the same time it seemed incredible that an assertion of this kind in a standard bird-book should have remained unnoticed and uninvestigated by American bird-men for twenty years; and as Cory's shearwater still held its place in all our bird-books, I was puzzled. I recalled with intense regret the accidental loss of a specimen of *P. kuhli* which my father and I had once collected off Sardinia; and I set about trying to get together some skins of these big pale-billed shearwaters from both sides of the Atlantic, for comparison. Rosenberg, in London, wrote me that he had one skin only of *P. kuhli.* I meant to order this, and also to write to a bird-stuffer we knew in Cagliari, Sardinia; but other matters intervened, and I let the whole thing slip.

Then, hearing of Godman's "Monograph of the Petrels," I supposed it a matter of course that I should there find the question definitely settled. For some time I had no chance to see this work; and meanwhile I noticed that the latest-revised bird books in America were still hanging on to Cory's shearwater. Godman, then, had confirmed its standing as a distinct species? Apparently, this must be so. Yet the fact that in all these years a large shearwater breeding abundantly in the Azores had not been recorded even as a wanderer from our Atlantic coast seemed in itself an exceedingly suspicious circumstance. Strong-winged sea-rovers like these should find no barrier between the "Western Islands" and the New England fishing-banks.

My doubts continued until, in June of this current year, 1915, I was enabled through the kindness of the secretary of the Boston Society of Natural History to examine Godman's monograph. There I find the matter satisfactorily settled, in conformity with Saunders's statement and my own misgivings. Under the head of *Puffinus kuhli,* Godman (Part II., p. 96) says:

> Specimens from the eastern coast of North America have been described as *Puffinus borealis* by Mr. C. B. Cory, but I can not find any difference between individuals from the coast of Massachusetts and others from the Atlantic islands.

In his synonymy of *P. kuhli* he includes Cory's *P. borealis.*

It would seem unnecessary, not to say presumptuous, for us to question this determination, or wait to make further comparison of specimens before admitting that our "Cory's" shearwaters are simply Mediterreanean great shearwaters on their annual post-breeding-season pilgrimage to the fishing-grounds on the western side of the Atlantic. It must be noted, however, that the Azorean and Canary Islands birds have been found to be subspecifically distinct from those breeding in the Mediterranean, differing mainly in the smaller amount of white in the lining of the outer primaries. The Atlantic islands bird has been described by Hartert as *Puffinus kuhli flavirostris,*[1] and

[1] The name of *Puffinus flavirostris* was first used by Gould in 1834, for specimens of the Mediterranean (Azorean) shearwater from the Cape Seas. It appears that the species not infrequently wanders far southwards.

Godman states that the differences are inconstant, that a complete gradation evidently exists between the extreme types, and that the two forms can not be considered as more than subspecifically distinct. It is undoubtedly the Atlantic subspecies *flavirostris* which regularly visits our coasts. According to the American system, Number 88 of the A. O. U. Check-list, 3d edition, should evidently stand as *Puffinus kuhli flavirostris* Hartert, Yellow-billed or Azorean Shearwater. Gerald H. Thayer

Monadnock, New Hampshire,
June 21, 1915

IRON BACTERIA

It has been known for many years that some of the higher bacteria are concerned in the precipitation of ferric hydroxide from iron-bearing waters. Thus *Crenothrix polyspora,* which is often abundant in city water pipes where the water contains a small percentage of iron, is held to be responsible for the frequent turbidity of the water in such places, due to the separating out of ferric hydroxide, and also for the filling of pipes with ferric hydroxide which sometimes occurs. Certain other forms, like *Chlamydothrix ochracea, Spirophyllum ferrugineum* and *Gallionella ferruginea,* have been abundantly encountered in surface iron-bearing waters, where they form thick gelatinous deposits of yellowish-brown scum.

More recently certain lower bacteria have been described which show the same characteristics with regard to the precipitation of ferric hydroxide and which seem to be very abundant in surface waters.

Different investigators have attempted to explain this phenomenon in different ways. Some, notably Winogradsky and Lieske, believe that there is an oxidation from ferrous to ferric iron and that this furnishes the bacterial cell with energy. Lieske also claims that, as the iron is usually in solution as ferrous bicarbonate, the carbon dioxide set free by the oxidation is used by the cell for building up its tissues. Other investigators, like Molisch and Ellis, state that the precipitation of ferric hydroxide is a simple chemical phenomenon and is not connected with the life processes of the cell. They believe that the accumulations of ferric hydroxide upon these organisms or upon their remains is purely mechanical. At the same time they admit the association of iron bacteria with iron-bearing waters, and realize that ocherous scums in such waters consist largely of bacterial remains.

Most of the investigations on iron bacteria have been made in Europe and relatively few investigators have concerned themselves with the problem. At the present time the writer is engaged in a field and laboratory study of these organisms and it is hoped that this work may throw some further light on the peculiar phenomena connected with their activities.

During the field work it has been found that iron bacteria are present in almost all iron-bearing waters, surface as well as underground. *Crenothrix* and *Spirophyllum* have been found in city waters, *Spirophyllum* and *Gallionella* have been found in the underground workings of mines even to a depth of several hundred feet, while *Chlamydothrix* and *Spirophyllum* have been found in surface iron springs and bogs. It seems that the bacterial flora of different localities varies. In some localities iron-bearing waters have a mixed flora, while in other localities one finds almost pure cultures of one or another of the higher iron bacteria. Thus some iron springs contain big, fluffy masses of *Chlamydothrix,* while others contain a brownish-yellow deposit consisting almost entirely of *Spirophyllum.* Some mines contain in their underground workings only *Spirophyllum,* while others contain mixed cultures. The reason for this difference is not known, but it is possible that the character of the salts in solution influences the bacterial flora.

Lower bacteria, of the coccus or bacillus forms which precipitate ferric hydroxide, are more difficult to study than the higher iron bacteria, as they can be distinguished only by their physiological activities. In order to determine the general distributions of such organisms in nature various iron solutions were inoculated with different types of water and soil and it was found that ferric hydroxide was