those who took very high places in the Mathematical Tripos did so little afterwards.

Again on page 34:

He had two really wicked characteristics, that he would never allow any one to help him with his work, not even permitting invitations to be answered for him, and that he kept every single thing he received by post, even advertisements.

On page 36:

Lord Kelvin's visits were occasions of enjoyment to him, and great were the discussions between them, which anything served to begin; for instance, the eggs were always boiled in an egg-boiler on the table, and Lord Kelvin would wish to boil them by mathematical rule and economy of fuel, with preliminary measurements by the millimeter scale, and so on.

On page 44:

One day especially his silence in the House [of Commons] was remarked. Some scientific question had come up and still he said nothing. When we afterwards asked him why, he answered that he had been prepared to rise, but that another person had obviously wished to speak and had said enough, although he had treated the subject from a different standpoint from that which he should have himself adopted. Only one member beat him in regularity of attendance, Sir Richard Temple, who, however, lived in London.

Amongst the series of letters, one striking omission will be noticed, the absence of any correspondence with Lord Kelvin. We are glad to learn from the preface that these suffice to form a collection by themselves and that it has been decided to publish them separately, with a memorial of the lifelong friendship and collaboration of the writers. Of the numerous scientific matters which are treated in the letters given, it is only possible to mention one or two. In a letter to Sir Henry Roscoe dated February 7, 1862, he gives his share in the history of solar chemistry, which, in view of the off-repeated rumors that he had really antedated Kirchhoff, must be regarded as settling the question. He adds, "for I never published anything on the subject and if a man's conversations with his friends are to enter into the history of a subject there is pretty nearly an end of attaching any mention or discovery to an individual." As an instance of the gradual development of the theory of waves and heavy ocean swells we may turn to a long series of letters full of details and carefully thought-out ideas.

In conclusion, one must give high praise not only to the editor for the way in which he has done his work in compiling this biography and to those who have assisted him, but also to the Cambridge University Press for a couple of volumes which are issued in a form suitable either for continuous reading or careful consultation.

E. W. B.

Yale University

American Birds. Studied and photographed from life by William Lovell Finley. Illustrated from photographs by Herman T. Bohlman and the author. New York, Charles Scribner's Sons. 1907. Pp. xvi + 256.

In an attractive volume of moderate size Mr. Wm. Lovell Finley describes in popular style the habits of a considerable number of western birds from the rufous humming-bird to the golden eagle. For the pictures, most of which are excellent, we are equally indebted to Mr. Herman T. Bohlman, who has been the author's companion in the field for many years.

We are told in the preface of this book that "each chapter represents a close and continued study with camera and note book at the home of some bird or group of birds—a true life history of each species." All who watch birds on this side of the Mississippi will be glad to see a faithful transcript of their manners on the Pacific slope, and should not be disappointed to find that their behavior is essentially the same wherever found.

The interests of the author seem to have centered in the acquisition of good photographic illustrations, and in this he has succeeded far better than most students who have gone into the field with such a purpose. Among the more noteworthy pictures may be mentioned some of the rufous humming-birds; the Maryland yellow-throat, a common but extremely shy species whose nest and eggs are rarely seen; the nest, eggs, and young of the red-tailed hawk, one of which shows the re-

mains of a big carp, the same fish which the author on that very day saw caught in a distant pond and carried by the old bird to its aerie; white-crowned sparrows; bluebirds perched on a line, and especially the picture of a young bluebird trying to seize food from its parent; warbling vireos feeding their young and standing at inspection, as well as some of the heron and eaglet pictures. Many which were taken on a five-by-seven plate have been trimmed rather too close in order to crowd them on the page, even to the clipping of a bird's wing or tail, or the scamping of its nest. Most of the illustrations are of immature birds or of adults bringing food to their young, whether in or out of the nest; nine only show the feeding process. There are no strictly serial pictures of either growth or activities, which approach biological completeness, in any of the species treated. The editor of a well-known magazine once rejected some pictures of little naked cedarbirds on the ground that they would be "positively objectionable" to a certain class of readers, and possibly the same class of readers would object to illustrations of serial activities. At all events, such pictures would add to the interest and value of any work, and would not injure its sale; so far as nest-life is concerned, they should include: the parent bringing in the food, the pause at the nest which calls forth the initial feeding reaction of the young, placing the food in the throat of the nestling, and watching for the response—which amounts to testing the throats of the young, and giving the food to those which can swallow it—standing at inspection, and cleaning the nest. When both birds come to the nest together they should be shown as a complete family group or unit. It may be added that such completeness should be aimed at, even if it can seldom be attained. Of the so-called "snapping" of isolated scenes in and about the nest a good deal has already been done, and in many cases to little purpose. The photographer should primarily be the student who aims to portray the whole behavior—the serial acts and attitudes of the adult and young. Whoever does this, even in the case of a few species, will make a most noteworthy contribution, whether from the popular or the scientific point of view.

Mr. Finley's twenty-one chapters deal successively with different families or species of birds, and he tells his story in a bright and entertaining manner. Aside from certain mannerisms, and the occasional tendency to pile up and mix his metaphors, the author writes well and effectively. In a single paragraph the rufous hummingbird is likened to "a flying fleck of a rainbow," a "flash from a whirling mirror," a "little shooting star . . . that hummed as well as glowed," to the "glint of real live sunshine," to "a minute ethereal sprite," and to "a mite that possesses the tiniest soul in feathers." In still another paragraph the hummer's flight is "like the rush of a rocket," "a red meteor," but "instead of striking with a burst of flying sparks, he veered just above the bushes with a sound like the lash of a whip drawn softly through the air." Again he "swung back and forth like a comet in his orbit." This puts an unfair strain on the reputation of so small a bird, and we should prefer to eliminate some of the "papas," "mamas," "babies," "bantlings," "marriages" and the like. The author is at his best in the chapters on the larger birds, the hawk, the owl, the crow, the heron and the eagle. These are all very interesting and abound in quotable passages.

Of the temper of the barn owlet he says: "Generally he sat with his chin resting on his chest like a broken-down lawyer. Once, when the photographer was least expecting it, he dropped on to his trousers leg as lightly as a feather, but with the strength and tenacity of a mad bull-pup. The claws sank through to the flesh, and before they could be pried loose they had drawn blood in three places." "In a Heron Village" this vivid picture is found: "When I first climbed in among the nests of a smaller tree with my camera, it sounded as if I were in the midst of a gigantic hen-house. Some of the birds were clucking over their eggs that were soon to be hatched; others were cackling over newly-laid eggs and squawking at being disturbed; others were wrangling and squabbling, so that there was a continual clattering fuss

above which one had to yell his loudest to be heard. . . . About me, seemingly almost within reach, I counted thirty-six sets of blue eggs. I was high above the tops of the alders and willows. Set all about below in the background of green were the platforms, each holding several eggs of blue. The trees were dotted in every direction. I counted over four hundred eggs in sight."

The most interesting observations recorded, from the standpoint of the reviewer, are the following: the young of the Vigor's wren were drawn or driven from the nest, when ready for flight, by the male, who would seize all the food which the female brought, until the young were forced to leave. The question of intelligence is not directly raised, but undoubtedly both birds were acting in this case from pure or nearly pure instinct, the female in hunting the prey, and the male in seizing it. We should expect to find intelligence developed in an equal degree in either sex. A bluebird box is mentioned in which one hundred and ten birds were hatched in eight years, and during one season there were three broods of 7, 7 and 5 birds, respectively. In one case, and this is a most interesting observation, two young bluebirds of the first brood followed the male about while the female was incubating her second litter. When the latter hatched the same young began to follow their mother, and they imitated her so well that they not only captured worms, but carried them to the box and fed their brothers and sisters of the second brood. It would be difficult to find a better example of imitation in young birds, having without doubt its base set firmly in instinct. But this suggestion is perhaps even more prosaic than that of the author, who surmises that "Perhaps the two birds of the first brood were girls, and took readily to housework." An oriole is mentioned which mated four times in succession before she was allowed to rear a family, the males having been successively shot by a collector. A western gull was seen to seize a clam, rise with it to a height of thirty feet and drop it on the hard ground. This act was repeated fifteen times before the bird was successful in breaking the shell and getting the soft meat. In parts of the old world gulls are said to resort to certain rocks for the purpose of breaking shellfish, which is by no means incredible. The act is intelligent, and is a good illustration of associative memory. The habit seems to be a rather rare and sporadic one.

In the nest of the golden eagle the author speaks of finding branches of green laurel, which were apparently renewed, when taken away. I have found freshly cut sprays of green hemlock in the nest of the red-tailed hawk, and fresh seaweed is said to be laid upon its mountain of a nest by the osprey. Herring gulls also add green materials to their nests from time to time. I have seen this gull while sitting on her eggs rise up, pull some fresh grass, tuck it under her body, and then settle back upon her eggs again. The "habit" is probably the same in every case, and may represent what I have called the "recrudescence of the building instinct." The fact that the leaf or the spray is fresh and green may attract undue attention.

The author remarks in his preface that "an important and sometimes difficult study of bird-life is to observe accurately and report without false interpretation the habits and actions of the birds." We should rather say that this was the whole matter, and sufficiently difficult at all times. Possibly in a popular work of this kind it would be hardly fair to hold the writer to the letter of his text. However, we note a few cases in which we can not agree with his statements or interpretations. Two paragraphs are devoted to the "heroic" act of a chickadee in clinging to her eggs when her home was invaded. It should be added that the nest-hole of the flicker can be sawn open and the broody bird lifted from her eggs or newly-hatched young with even greater ease and freedom, and all are familiar with the so-called "total depravity" of the setting hen. If we call the bird a hero in the first act, we must dub it a coward in the next, for when the flickers are a week old their parents have become excessively shy. In all such cases we have a common illustration of how

the instinct of fear is temporarily blocked or allayed by the stronger parental instinct, namely that of brooding the eggs or young.

The kingfisher's feet are said to be "deformed," and the author remarks: "I am sure a kingfisher would never pretend to walk." To be sure this bird is somewhat of a clodhopper, since he walks upon his whole foot, the proper attitude of a bear or man, and not simply on his toes like most birds, but even the young kingfishers are walkers and during the close of their subterranean life they learn the curious habit of walking backwards.

The paragraph on imitation (V. foot of p. 175) needs considerable revision. How can imitation be regarded as "the strongest factor in the life of the chick from the time it leaves the shell," if by "chick" "nestling" is meant, or how can "nest-building" be ascribed "largely to imitation," or "the lasting impressions in a bird's life" be formed "during the first few weeks of its existence"? Although singing is primarily due to instinct, it may be greatly modified through imitation, but nest-building in all its initial and important stages must be ascribed to instinct alone, and all the acts of young altricious birds show that they are quite incapable of any effective imitation whatever. As to intelligence, we may add that the first trace of it in the nestling is its learning "to know" its parents, in other words learning to limit its feeding reactions to those conditions which count, namely, to the presence or sounds of the old bird. In some cases such a power is partially acquired in two or three days. If young birds in the nest did really imitate so keenly, why do we not see the results of it in the European cuckoo and the cowbird; or must we regard them as bad children upon whom a good education is thrown away by their devoted foster-parents?

The polity of the gull community and nursery is not to be found in Mr. Finley's chapter on this bird, but the subject will repay the most careful study. Gull chicks are said to "show little fear," but we have found them very fearful after the fourth day, and from that time onward their fear seems to increase, unless brought up by hand. "Each mother" gull is said "to recognize her chicks largely by location." On the contrary, we have found by swapping chicks that they discriminate absolutely. One of the fiercest instincts of the herring gull is to defend its preserve and drive off intruders, and many stray and trespassing chicks are thus daily slaughtered in consequence.

Of a tame shrike that would come to call the author speaks in this wise: "His favorite perch was the back of a chair near the window, where he could look out over the slope, and here he would sit for an hour at a time, as if thinking. And how do we know but he was going over many of his hunts and hairbreadth escapes and thinking of the springtime that was coming and the new experiences it would bring?" "I have often wished that I could fathom the thoughts that Jimmy had." This should be compared with a paragraph where the robin, certainly a bird of average intelligence, is dealt with: "I was standing in the back yard watching a robin that came for string to build her nest. I had wrapped a piece several times about a limb to see whether the bird would use any intelligence in unwinding it. I have always been sceptical of some of the stories that have been told of birds reasoning. For example, one writer tells of an oriole that took a piece of cloth and hung it on a thorn so the thread could be pulled out. When the cloth came loose, he said the bird refastened it. Again, he has the bird tying knots in the string to keep the ends from fraying in the wind, or tying the sticks together to make support for the nest. But these are not bird actions: they are evolved out of the fertile brain of the writer." We all recognize the "fertile brain" referred to, about which enough has been said, but if birds really have the power of abstract thought, and therefore of a high degree of intelligence, why should the fancies of the romancer be deemed impossible? What, indeed, are thoughts for—?

In spite of the criticisms of such matters as are here suggested the volume is a fresh contribution to popular ornithology, and is

both interesting and informing in an unusual degree.

Francis H. Herrick

SOCIETIES AND ACADEMIES

ORGANIZATION MEETING OF ILLINOIS STATE ACADEMY OF SCIENCE

More than one hundred persons gathered in the senate chamber at Springfield at ten o'clock Saturday morning, December 7, for the purpose of organizing a state academy. The meeting was called to order by A. R. Crook, curator of the State Museum, and U. S. Grant, Northwestern University, was elected chairman.

The opening address by Professor Chamberlin, on "The Advantages of a State Academy of Science" was given in the extemporaneous form and the following outline very imperfectly represents what was said.

Professor Chamberlin introduced his address by conveying the felicitations of the Chicago Academy of Sciences, and sketched some of the salient features of its history of a little more than fifty years, as a means of giving concrete illustration to some of the problems which the new academy must face. Special attention was directed to the radical change in the nature and relations of scientific activity since the oldest academies of the interior were established. In the pioneer days, an almost virgin field was open to naturalists, and enthusiasts in this field constituted the largest factor in the membership of its academies of science during their early stages of development. The results of these pioneer workers were much more fully within the appreciation of all their colleagues and of the intelligent public than are the products of the more highly specialized investigations of to-day. So widely has research deployed in the last fifty years, and so far has it reached into the more recondite phases of each field, that there is now far less community of interest and of intelligent appreciation, even among scientific workers themselves. This fundamental change brings new problems of organization and of adjustment. In like manner, the function of an academy as an avenue of publication has assumed a new aspect. Fifty years ago, an appropriate means of publication was one of the greatest needs which the academies supplied to the pioneer workers, for, aside from these academies, the available opportunities of giving publicity and permanence to scientific results were few and unsatisfactory. As the regional element was dominant in the results of the early naturalists, it was fitting that there should be a local means of publication. To-day, however, the results of research are, in general, more serviceable to scientific workers if they are gathered into the special journals devoted to the several departments of science. While the function of publishing the results of regional investigations still remains and may well continue to be subserved by the regional academies of science, and while certain adaptations of other results may serve an important regional purpose, the question whether an academy should endeavor to be the avenue of miscellaneous publication to the same extent as in the early days is one of the problems that invite the serious consideration of a new academy.

Attention was also directed to the problems presented by the geographic distribution of the centers of scientific activity within the state and by the not altogether felicitous relations of these centers to the capitol of Illinois.

The advantages of a state academy to those who are just entering upon scientific careers, to amateurs dissociated from institutions of research, to trained workers in relative isolation, and to workers in scientific centers, were specifically set forth. The values to be derived from opportunities of reading papers before fellow workers, of submitting results to discussion, of participating in the discussion of others' results, of extending scientific acquaintance, of cooperation, of mutual stimulus to endeavor, of personal education by contact with other workers, were dwelt upon in detail. The value of the academy as a means of disseminating the spirit, the method, and the love of science among the people of the state was especially emphasized. The func-