The other papers in 'Cassinia' are: 'The Mourning Warbler in Warren County, Pa.,' by Thomas H. Jackson; 'Some Birds of a Maurice River Farm,' by Chreswell J. Hunt; 'Catoxen Cabin on the Ranconcas,' by George Spencer Morris; 'Bird-Life at Catoxen,' by Witmer Stone; 'Three Finds in South Jersey,' by Robert Thomas Moore; 'A List of the Birds observed on the Barnegat Region of the New Jersey Coast in August, 1908,' by Wm. C. Braislin, M. D.

The Club held sixteen meetings during the year 1908, with an average attendance of twenty-two. The officers for 1909 are William A. Shryock, President; Stewardson Brown, Vice-President; Chreswell J. Hunt, Secretary; Samuel Wright, Treasurer; Witmer Stone, Editor of 'Cassinia.' — J. A. A.

Stone's 'A Review of the Genus Piaya Lesson.'— Mr. Stone[1] here recognizes three species — *P. melanogastra, P. rutilus,* and *P. cayana,* the latter with 10 subspecies, two of which are described as new. This revision is based on 259 specimens, and, of course, is made from the modern viewpoint. He refers to a brief review of the group made by the present writer in 1893, pointing out several errors made, as he kindly says, "largely through lack of material," and notes that "he ignored Cabanis's explanation of the true nature of Gambel's *macroura,*" etc. We may here explain that Part IV of the 'Museum Heirnanum,' which contains Cabanis's review of the genus, was not then accessible to us, the copy of the work then available containing only the first three parts; otherwise probably Cabanis's ruling on the type localities of *P. macroura* Gambel and *P. circe* Bonap. would not have been 'ignored,' and the consequent errors would have been avoided. It is of interest that Mr. Stone is able to so emphatically confirm Cabanis's opinions on these two important points.

After reviewing the history of the group, Mr. Stone presents a 'key to the species and subspecies,' followed by the synonymy and a brief description of each form. If the forms to which critical reference is made had all been given in the synonymy of the species it would have added to the convenience of future investigators of the group, and have made clearer the several nomenclatural departures from current usage, all of which seem to be well founded. It may be added that the two new subspecies — *P. cayana caucæ* and *P. c. boliviana* — are based on recently acquired material in the American Museum of Natural History.— J. A. A.

Watson's 'The Behavior of Noddy and Sooty Terns.'[2]— This is the report of observations made by the author at Bird Key, a small island of the Dry

[1] A Review of the Genus *Piaya* Lesson. By Witmer Stone. Proc. Acad. Nat. Sci. Philadelphia, Vol. LX, Pt. 3, July–Dec., 1908, pp. 492–501.

[2] The Behavior of Noddy and Sooty Terns. By John B. Watson, Professor of Experimental and Comparative Psychology, The Johns Hopkins University. Papers from the Tortugas Laboratory of the Carnegie Institution of Washington, Vol. II, 1908 (1909), pp. 187–225, pll. i–xi, and 2 text fig. [Separates not dated, but distributed early in March, 1909.]

Tortugas group, during May 4–July 18, 1907. The author says: "The specific object of my stay was to observe as far as possible the details of the lives of the noddy terns (*Anous stolidus*) and the sooty terns (*Sterna fuliginosa*) during their nesting season on that island.... Our interest.... centered around the portrayal of their activities." The work was conducted from the viewpoint of the psychologist, and is said by the author to be preliminary, and adds: "but since the immediate continuation of the work is not assured, and since work of the kind is more or less 'impressionistic,' the attempt is here made, while the material is still fresh in mind, to enumerate some of the more important problems to be found in the study of these birds and to set forth my tentative efforts to solve them."

A general description of the two species is followed by an account of the geographical situation and history of the present colony of terns, which occupies "a small coral island about 300 yards wide (east and west) by 400 yards long (north and south)," situated about 66 statute miles due west from Key West. "Owing to its juxta-tropical location, its slight elevation, and the condition of its surface (largely coral sand), the actual surface-temperature of this island is very high, ranging at times during the hottest days from 124° to 143° F." The only vegetation consists of bay-cedar bushes, abundant over the central and western parts of the island, and a dense cactus growth over a small portion of the southeastern part, both being used by the noddies for nest-sites.

The food and feeding habits, the mating, nest-building, and the daily activities of both species throughout the breeding season are minutely detailed, together with an account of the development of the young in captivity, and of tests as to recognition between mates, and of the egg, nest, and nest locality. There are also accounts of experiments on distant orientation, and on the "learning of problem boxes" and "the maze." Such a minute and detailed study, conducted with scientific exactness, of the activities of any species of wild bird has doubtless never before been made, and is hence of the highest interest as a contribution to the life histories of the two species here under investigation, aside from its value from the psychologic side. The matter is divided into sections, under special subheadings, each section closing with a brief summary of the subject under discussion.

Under 'Food and Feeding Habits' it is stated that neither species ever touches the water except to drink or bathe; they "never swim nor dive," and in bathing never completely immerse the body, the breast and head being the only parts dipped into the water. In feeding they follow schools of minnows attacked by other fish, and "pick off these minnows as they hop up above and over the surface of the water." They thus differ greatly in habits from our northern species of terns, which freely plunge beneath the surface to secure their prey. The birds appear to fish exclusively in the daytime, they all returning to the island at night. The author gives it as his belief that "these birds rarely leave the island [on their fishing trips] for distances greater than 15 knots." This belief is based on the

testimony of light-house keepers and on a single cruise in a launch for observation.

When the author arrived at the island, on May 4, both species were already actively engaged in nest-building, and some of the birds were beginning to lay. Thus there was little opportunity to observe the mating of either species, which are reputed to mate before reaching the island. He, however, records a "striking series of reactions between two noddies," which he considers may have been a case of mating. The supposed male began nodding and bowing to a supposed female (the sexes are externally indistinguishable), when the latter gave immediate attention and began to extract fish from the throat of the other bird. "The feeding reaction was alternated with the nodding." Then the male brought a stick and deposited it near the female, and then the male attempted sexual relations.

The noddies nest in bushes; the number of nests was estimated at 700, which would give a total of 1400 adult noddies on the island. The nest of the sooty, when any is made, "consists of a shallow oval depression in the sand." The number of nests of this species on the island was found to be (approximately) 9429, which would indicate the presence of 18,858 adult sooties. Where the nests of the sooties "are very numerous they often are not more than 10 to 12 inches apart. On account of this close grouping of the nests," says the author, "and of the quarrelsome nature of the brooding birds, *exact localization of nest* and *recognition of nest and mate* easily became the most important features in the lives of the sooty terns. This situation affords a convenient starting-point for a psychological study of the behavior of these birds."

Under 'Reactions of the Noddies [and Sooties] observed in nest-building' are given a very detailed account of the actual nest-building of a pair of noddies, and of the selecting of nesting-sites by the sooties and the formation of their nest cavity. Under the caption 'The Daily Rhythm of Activities' are detailed with great minuteness the daily routine of each species, before the egg is laid, during incubation, and after the egg is hatched; from which it appears that in the case of the noddy the male and female pursue a different daily routine during the period of nest-building and before the egg is laid, the female remaining almost constantly at the nest, the male supplying her with food. During the nest-building and egg-laying period the chief points in the lives of the noddies are thus summarized: "(1) there is common activity in the building of the nest; (2) the female guards the nest while (3) the male procures food for both." The manner of feeding the female by the male, as here described, is well worth citing, not only for its intrinsic interest, but also as an illustration of a highly specialized vocabulary: "The male fishes until intra-organic pressure of food in the crop reaches a certain intensity [in other words, until the crop is full]. This acts as a stimulus to return (proximate and distant orientation discussed on pages 224 and 277 respectively). The visual stimulus of mate (and nest and nest locality) coupled with the intra-organic stimuli

just mentioned, condition the feeding reaction [*i. e.*, on seeing his mate he proceeds to offer her food]. On the part of the female we have the intra-organic (hunger) stimulus and the visual stimulus induced by the movements of the male [*i. e.*, the female, being hungry, is willing to be fed]. The male disgorges until there is a cessation of the excessive intra-organic pressure, at which time his feeding movements cease and the female may strike his beak in vain. The female in her turn feeds until there is both a cessation of hunger and a normal intra-organic pressure established. If this takes place before the male is ready, he in turn attempts to further stimulate the female by a slight change in behavior (*i. e.*, 'coaxing' by tapping the female and putting his beak down near her)." [1]

In the case of the noddies: "After the egg is laid, a marked change appears in the behavior of both the male and female." Before this period the birds are shy and will not permit a near approach; later on they will viciously attack a human intruder, or will sit on the egg and allow themselves to be caught. In explanation: "It may be said here that the stimulus to the change is to be sought for in the tactical and visual impulses aroused by the egg," or in what, in ordinary parlance, would be termed parental solicitude. The male now no longer feeds the female, each bird taking equal turns at brooding the egg. A tabular statement is given of the shifts made at three nests of noddies for May 21, 22, and 23. The behavior of brooding noddies is thus summarized: "(1) The presence of the egg brings about a change in the distribution of labor between the sexes; (2) the male no longer feeds the female but each sex separately obtains its food; (3) the egg is brooded constantly night and day by both sexes, the male and female relieving each other at intervals varying from 30 minutes to 5 hours, the average interval being in the neighborhood of 2 hours; (4) the most significant general reaction caused by the presence of the egg is the change in the disposition of the birds."

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[1] This is not offered in personal criticism of Dr. Watson's excellent paper, but as a protest against the pedantry shown in nearly all modern research along new lines, where a new vocabulary is often invented for the expression of common-place knowledge. New terms are frequently needed for the expression of new facts, new processes, new hypotheses, but how often are well-known facts or principles hidden or obscured to all but the specialist by being clothed in a new verbiage. The science of ecology — the relation of the organism to its environment — *e. g.*, is burdened by pedantic expressions for previously observed and intelligently recorded conditions and relations, which are restated in new and often hypertechnical terms, with the air of their being a new contribution to knowledge. Text-books of the subject are necessarily accompanied with glossaries for the definition of the new terms employed, since they are not to be found in even the latest and most up-to-date dictionaries, while some of them would puzzle a linguist to determine their etymology and significance. The above annotated excerpt from Dr. Watson's paper merely illustrates the tendency to pedantic jargon in many of the newer lines of research. Dr. Watson is of course writing as a specialist in animal psychology, for other specialists in this field of research — not for the layman nor especially for ornithologists — and it is but natural that he should employ the vocabulary approved by his colleagues.

Similar observations are recorded on the behavior of the sooty during the period of incubation, in which are noted changes similar to those recorded for the noddy, with the important exception that the shift at the nest in the case of the noddy occurs about once in two hours, and in the case of the sooty only once in 24 hours. The period of incubation for the noddy is given as from 32 to 35 days; the period of incubation for the sooty was found to be 26 days.

The activities of both species after the egg is hatched are recorded in similar detail. The young of the noddy are fed at intervals varying from one to four hours, and those of the sooty every four to seven hours.

An interesting part of the paper relates to experiments in testing the ability of recognition between mates, and of the parents to recognize nest and young. While it is perfectly evident that such recognition must exist, and cannot with reason be doubted, Dr. Watson's tentative proof that such is the case is of interest. Birds were taken from marked nests, and the birds themselves were also marked with oil paints; while this process caused disturbance in the relations of the birds for a short time, they soon became reconciled to the new conditions.

Experiments in relation to recognition of the egg showed that neither species recognizes its own egg, as is well known to be the case with many other birds. Both species, also, would submit to considerable changes in the size and character of the nest, and even to a slight change in its position, without deserting it, but not without obvious recognition of the changed conditions. A large number of experiments have relation mainly to the length of time required for adjustment to the new situation. Where the environment was markedly altered the bird remained undisturbed so long as the position of the nest was not disturbed. Says Dr. Watson: "If one recalls the conditions under which they [the sooties] lay their eggs, namely, in open spaces and at distances apart sometimes not greater than 10 to 14 inches, one can not but admire the exactness and ease with which the sooty approaches her own nest." This certainly shows a high power of discrimination, quite in harmony with the action of birds in general, and perhaps renders not less wonderful, but perhaps less astonishing, the ability of migratory birds to find their way back to their own former nesting-sites after hundreds and even thousands of miles of migratory travel. With such power of local orientation as all birds show in the matter of the nesting-site, is it so very strange that they should be able — accidents and stress of weather aside — to orient themselves on their migratory journeys? While the exact nature of this ability may not be at present known, its possession is beyond question.

Dr. Watson's experiments on distant orientation are here for the first time fully stated, but the principal facts have already become more or less current. His comment thereon is disappointing inasmuch as no explanation is attempted. But perhaps this was to be expected for, as he says: "the facts obtained from them are extremely difficult for current theories of distant orientation to explain." These experiments, briefly

stated, are: (1) Six noddies, "marked characteristically and individually with oil paints," were put on board the laboratory launch bound for Key West; two, liberated when 19.5 statute miles distant, returned to their marked nests in 2½ hours after they were released; two were liberated at a distance of 44.75 statute miles and returned to their nests in 1¾ hours after their release; two were liberated at Key West, 65.8 statute miles distant, and reached their nests, one 11 hours later and the other about 23 hours later, night intervening when the birds probably did not attempt to fly.

(2) Three noddies and two sooties, captured and marked, and their nests likewise marked, were taken, June 13, via Key West, to Cape Hatteras and liberated 12 miles east of the Cape. Several days after the marked sooties were found at their nests, and a few days later one of the noddies was seen attempting to alight on its nest, but its mate, having formed new 'affiliations', this was not permitted. Dr. Watson states that he has no doubt the other two noddies returned to the island and were likewise not permitted to return to their nests. The distance in a direct line from Bird Key to Cape Hatteras is about 850 statute miles, and by way of the coast about 1080 statute miles. The birds were thus taken hundreds of miles to the northward of their normal range, yet were able to return quickly to their nests on Bird Key.

(3) On July 8, two noddies and two sooties, marked for identification, were taken to Havana; they were released on the 11th, and reached Bird Key on the following day. The birds were in such poor physical condition from the strain of caring for their nearly full-grown young that it was decided not to take them further away before releasing them.

In the present connection there is space merely to call attention to Dr. Watson's interesting experiments with young terns in learning the 'problem box' and the 'maze,' which are of special interest to the psychologist rather than to the ornithologist. Dr. Watson's paper, as amply shown above, is noteworthy from the double viewpoint of ornithology and psychology; it is a detailed and continuous study of the activities of two species of a very interesting group of birds during nearly the entire season of reproduction. The accompanying eleven plates illustrate the nesting attitudes of the old birds, young of various ages of both species, groups of nesting sooties, flashlight pictures, to show the possibility of studying the behavior of the birds at night,the character and grouping of the nests of the noddies, and the group activities of both sooties and noddies.— J. A. A.

Publications Received.— **Berlepsch**, Hans Graf von. On the Birds of Cayenne. (Novitates Zoologicæ, XV, pp. 103–164, 261–324, June and November, 1908.)

Bangs, Outram. (1) Notes on Birds from Western Colombia. (Proc. Biol. Soc. Washington, XXI, pp. 157–162, July 27, 1908.) (2) A New Tyrant-bird from the Santa Marta Region of Colombia. (*Ibid.*, p. 163.) (3) Notes on some Rare or not well-known Costa Rican Birds. (*Ibid.*, XXII, pp. 29–38.)