

ISLAND TRANSPORT OF MARINE SHELLS  
BY BIRDS ON PEREZ ISLAND ALACRAN  
REEF, CAMPECHE BANK, MEXICO

THOMAS WRIGHT AND LOUIS S. KORNICKER

Reprinted for private circulation from  
THE JOURNAL OF GEOLOGY  
Vol. 70, No. 5, September 1962  
Copyright 1962 by the University of Chicago  
PRINTED IN U.S.A.

ISLAND TRANSPORT OF MARINE SHELLS BY BIRDS  
ON PEREZ ISLAND ALACRAN REEF,  
CAMPECHE BANK, MEXICO<sup>1</sup>

THOMAS WRIGHT<sup>2</sup> AND LOUIS S. KORNICKER<sup>3</sup>

ABSTRACT

The Brown Noddy Tern (*Anous stolidus*) lines its nest with marine shells and debris. The weight of shells in ten nests on Perez Island, Alacran Reef, Campeche Bank, totaled 12,435 gms. The shell accumulations in nests contain species common to shell deposits on nearby beaches. The shells are mostly from burrowing pelecypods inaccessible to birds when alive and are not used as food. Bird deposits may be distinguished from beach deposits by the scarcity of coral fragments which are abundant on the beaches.

Perez Island (Isla Perez) is the largest and only inhabited island of five sand islands on Alacran Reef, which is located about 70 miles north of the port of Progreso, Yucatán. The island, which is about 800 meters long, 200 meters wide, and has a maximum elevation above sea level of about 3 meters, is formed of sand deposited by waves and currents on the southern edge of the lee side of Alacran Reef. The dominant vegetation is a low scrubby brush which grows profusely, except where cleared from the middle part of the island where two lighthouses, a radio weather station, homes of personnel who maintain the facilities, and various supply sheds have been constructed.

Isla Perez served as headquarters during June and July, 1959-60, for a party of Mexican and North American scientists investigating the geology and biology of Alacran Reef and surrounding waters. The work was sponsored by the Instituto de Geología, Mexico, the University of Texas, and the National Science Foundation (Grant No. 8902). A general description of the reef may be found in Kornicker *et al.* (1960). The data reported here were collected in 1960.

The islands of the reef are the nesting grounds for many birds: the sooty tern,

*Sterna fuscata*, and the brown noddy tern, *Anous stolidus*, nest on Isla Perez; the blue-faced booby, *Sula dactylatra*, the brown booby, *S. leucogaster*, the frigate bird, *Fregata magnificans*, and the laughing gull, *Larus atricilla*, nest on Isla Desertora; the blue-faced booby nests on Isla Pajaros; the frigate bird and a few terns nest on Isla Desterada. The royal tern, *Thalasseus maximus*, was observed flying in the area, but nests were not noted on the islands. Sanderlings, *Crocethia alba*, were seen on Isla Desertora and may nest there.

The birds in the area construct simple nests by placing a few twigs around the egg or making shallow depressions in the sand. An exception is the noddy tern, whose nest is constructed of twigs and contains marine shells and other marine debris, such as bits of sea fans and algae. As four thousand noddy terns were estimated by the authors to be nesting on Isla Perez in July, 1960, the quantity of shells transported inland from the sea might be quite large and, therefore, have geological significance. To document the quantity of shells being transported by the terns and also to determine if the content of the nests varied from place to place, ten nests were collected from the brush on Isla Perez (fig. 1). Nests that were unoccupied were selected, and nests without shells (10-20 per cent of the nests did not have shells) were not included in the collection. It was observed that new nests are often built

<sup>1</sup> Manuscript received August 22, 1961.

<sup>2</sup> University of Texas.

<sup>3</sup> Department of Oceanography and Meteorology, Agricultural and Mechanical College of Texas, College Station, Texas.

upon old ones so that layers of shells alternate with layers of twigs. In one such series, nineteen nests were estimated to be constructed one upon the other. Data on weight of shells in each sample, which consisted of either a single nest or several nests superimposed, are presented in table 1. The shells in the nests were identified by Mrs. Winnie Rice, and their names and distribution are listed in table 2. Shells of the pelecypod *Codakia orbicularis*, which formed about 90 per cent of each sample, are abundant along the beaches of Isla Perez, which are the

probable source of shells used in nests. The composition of mollusks in the nests was fairly uniform for the areas sampled, but it was observed that in series of superimposed nests the composition varied, with some nests containing few mollusks but large quantities of the algae *Halimeda* and *Sargassum*, indicating that the kind of material used in the nest may depend on its availa-

TABLE 1

WEIGHT OF MOLLUSKS IN NESTS OF NODDY TERN (*Anous stolidus*) FROM ISLA PEREZ\*

Sample	Weight (In Gm.)
A . . . . .	785
B . . . . .	2,395
C . . . . .	1,330
D . . . . .	630
E . . . . .	1,100
F . . . . .	340
G . . . . .	2,280
H . . . . .	1,190
I . . . . .	1,615
J . . . . .	480
Total . . . . .	12,145

\* Ten samples were collected; each sample consisted of one nest or several superimposed nests.

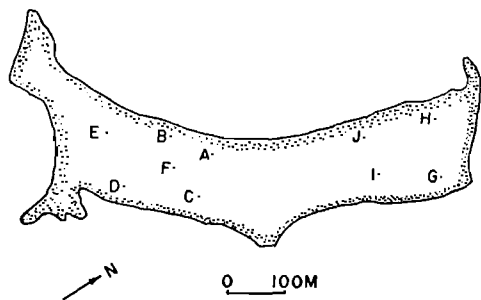


FIG. 1.—Outline map of Isla Perez indicating original location of brown noddy tern nests collected in this study.

TABLE 2

MOLLUSK SPECIES IN NESTS OF NODDY TERN (*Anous stolidus*) FROM ISLA PEREZ\*

Species	Remarks
<b>Pelecypoda:</b>	
<i>Codakia orbicularis</i> Linne . . . . .	About 90 per cent of shells in each sample
<i>Lucina pensylvanica</i> Linne . . . . .	Several valves in each sample
<i>Barbatia cancellaria</i> Lam. . . . .	Several valves in each sample
<i>Glycymeris pectinata</i> Gmelin . . . . .	Fragments in samples
<i>Modiolus americanus</i> Leach . . . . .	Fragments in samples
<i>Chlamys imbricata</i> Gmelin . . . . .	Fragments in samples
<i>Lima scabra</i> Born . . . . .	Fragments in samples
<i>Laevicardium Laevigatum</i> Linne . . . . .	Fragments in samples
<i>Ostraea frons</i> Linne . . . . .	Fragments in samples
<i>Arca</i> sp. . . . .	Fragments in samples
<i>Chama</i> sp. . . . .	Fragments in samples
<i>Tellina radiata</i> Linne . . . . .	Fragments in samples
<i>Divaricella dentata</i> Wood . . . . .	Fragments in samples
<b>Castropoda:</b>	
<i>Acmaea iamaicensis</i> Gmelin . . . . .	1-6 in five samples
<i>Diodora listeri</i> Orbigny . . . . .	1-3 in four samples
<i>Scaphella</i> sp. . . . .	Fragment in sample G
<i>Busycon</i> sp. . . . .	Fragment in sample I

\* Ten samples were collected; each sample consisted of one nest or several superimposed nests. Identifications by Mrs. Winnie Rice.

bility at the time the nest is being constructed. Fish bones were present in some nests, but these may be the remains of food rather than nest lining.

Teichert and Serventy (1947) describe shell deposits along the coast of Western Australia, South Australia, Victoria, and Tasmania that were accumulated by birds, probably by the Pacific gull, *Gabianus pacificus*. These shell deposits are ascribed to the dropping of shells by birds on hard surfaces in order to break the shells, so that the gulls may devour the animal, and are composed mostly of mollusks (gastropods) that live on sand or rock surfaces in the intertidal zone and, therefore, are accessible to birds that prey upon them. Shells in the nests of the noddy tern, on the other hand, belong dominantly to burrowing species of pelecypods that while alive are physically inaccessible to birds. Knowledge of the living habitat of mollusks whose shells have been accumulated by birds may be useful in distinguishing between deposits formed by birds using mollusks for food and deposits formed in nest construction.

Teichert and Serventy (1947) stressed

the possible geological importance of shells distributed by birds as follows: "If found in a continental series they could easily be interpreted as marine intercalations and even if found loose at some height above present sea-level they may under certain conditions simulate marine shell deposits suggestive of former high sea-level stands. Thus in dealing with shell deposits of comparatively recent age it may be necessary to realize that not all such deposits indicate eustatic emergence or local uplift." These authors suggest the possibility of distinguishing bird-borne deposits from marine deposits by the small number of species in bird deposits. Although this method may be useful in distinguishing between marine deposits and shell deposits accumulated by birds using the mollusk for food, it is less likely to be effective if shells were gathered for nest-building, as the shell accumulations in nests on the Isla Perez closely resemble shell deposits on nearby beaches. The scarcity of coral fragments in nests in contrast to their abundance on the beaches of Isla Perez suggests that the relative abundance of coral fragments in an accumulation of shells might help distinguish between nest and beach shell deposits.

#### REFERENCES CITED

- KORNICKER, LOUIS S., BONET, F., CANN, ROSS, and HOSKIN, CHARLES M., 1960, Alacran Reef, Campeche Bank, Mexico: Univ. Texas Inst. Marine Sci., v. 6 (1959), p. 1-22.
- TEICHERT, C., and SERVENTY, D. L., 1947, Deposits of shells transported by birds: Am. Jour. Sci., v. 245, no. 5, p. 322-328.