appeared to be a factor in furnishing lime. Prehistoric sand dunes filled with old marine shells are also a possible source of lime, and such seem to support a much larger population of land snails. Such sites are the mouth and lower reaches of the Pistol River in Oregon, the Smith and Mad Rivers in California. In such areas snails are to be found well into the dunes, even in what many might consider to be poor vegetation cover.

Shell mounds, or Indian middens, with the loose soil, filled with bits of broken clam shell, also furnish free lime to the snails. Personal observations indicate that the snail populations around such sites are more dense than in similar vegetation cover nearby.

The majority of the reef, sea stack, insular, headland complexes, appear to be remnants of more massive headlands that were separated, broken apart, or worn into more or less their present condition by the rise and fall of the sea level during the glacial and interglacial periods of the Pleistocene. Most paleontologists consider that our present genera of land snails were present and had a similar distribution during that geological time. There are areas that have altered since the glacial periods to such an extent that land snails may no longer inhabit the region, or else other species have moved in, replacing the original forms. At the present time, apparently the insular and headland races of *Monadenia, Vespericola,* and *Haplotrema* on the Pacific Coast, were present prior to this breaking up of the larger headlands, and survived in suitable locations that furnished them with cover, food, and lime.

SNAILS ON MIGRATORY BIRDS

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During nocturnal woodcock-banding operations by the Louisiana Cooperative Wildlife Research Unit in the winters of 1964-65 and 1965-66, snails (*Succinea unicolor* Tryon) were found among the feathers of some of these migratory birds. The banding was done in the Atchafalaya River Basin area in Louisiana.

Various birds were caught during these operations but snails were found on only 3 species: woodcock *(Philohola minor),* common snipe *(Cappella gallinago),* and whippoorwill *(Caprimulgus vociferous).* Since the banding was primarily aimed at woodcock,

only the snails found on them were given special attention.

During the 1964-65 winter, 2754 woodcock were banded and in 1965-66 the number was 1103. The first season the number of snails per bird ranged from 1 to 14 and during the second year it dropped to from 1 to 8. The drop was most likely due to a long drought which was not broken until mid-December. During 1965-66 banding program every 10th woodcock was weighed, sexed, aged, and checked for snails. Of the 96 woodcock checked, 11.4% had snails present. Of those, the average number of snails per bird was 3. There seems to be no correlation as to age of bird, sex, size and the age of the snail. Snails involved in these associations ranged in size from 1.5—9.0 mm. It seems to be purely a matter of chance as to whether any particular bird has on it any particular snail.

The snails were found at different positions on the birds. Some were at the base of the feathers on the upper breast, mid-breast, and low breast; others were at feather bases under the anterior feathers of the mid-abdomen between the legs; some were on the outside of the tibio-fibula, on the outside of flank feathers at the base of the tail, on the underside of feathers outside of the tibio-tarsus, and at the base of the undertail coverts. In no case were the snails on the dorsal surface of the birds.

Why are these Succineids on the woodcocks? At this point there is no answer; only hypotheses. Since the woodcock is a nocturnal feeder whose diet is composed almost exclusively of earthworms, it needs damp or even wet soil to facilititate probing for the worms. Thus, perhaps it is mere chance that the snails happen to crawl onto the bird while it is sitting in their locality. Perhaps the warmth of the bird attracts the snails. Since the snails, in most cases, were taken from the *base* of the feathers, perhaps the snails are feeding on some material at that point. The reason remains to be determined.

In any case, these are not the only records of the occurrence of snails on migratory birds. Rees (1965), in summarizing the work of others, points out that *Physa* sp. has been found on the upland plover *(Bartramia longicauda)* and *Succinea riisei* (Pfeiffer) on the bobolink *(Dolichonyx oxyzivorous)* and on the western vesper sparrow *(Pooecetes gramineus)*. All these birds are migrants also.

Recaptures of the banded woodcock have occurred in many places in their migratory range: Ontario, Michigan, Massachusetts,

etc. Here, again, is evidence of one of the means of distribution of our molluscan fauna. We have no records of snails on these recaptures since there is no program of examination for snails after recapture. Such would be ideal.

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NEW AND OLDEST RECORDS OF PELECYPOD MYA FROM WEST NORTH AMERICA, SOUTH OF ALASKA

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During a detailed biostratigraphic study of the Neogene Formations of the Coalinga region, California, the writer collected two specimens of the pelecypod *Mya* (figs. 1-3) from the middle of the Middle Miocene Temblor Formation. The significance of these occurrences, constituting the oldest known records of the genus from the northeastern Pacific, south of Alaska, and their bearing on the evolutionary history and the biogeography of the genus are discussed briefly below.

The earliest recorded occurrences of *Mya* in America are from the upper part of the *Acila shumardi* zone (Middle Oligocene) of Popof Island, south of the Alaskan Peninsula, and from the lowermost part of the Poul Creek Formation of the Yakataga district, Alaska (MacNeil, 1965, p. G14). This oldest American species was identified as *Mya kusiroensis* Nagao and Inoue 1941, by MacNeil, who regarded the species as a trans-Arctic migrant from the western Pacific (MacNeil, *op. cit.,* p. G2). The same species occurs in Middle Oligocene strata of Hokkaido, Japan (Fujie, 1957; 1962), and is believed to have evolved directly from *Mya ezoensis* Nagao and Inoue, a species known from the Late Eocene or Early Oligocene Wakkanabe Formation of Hokkaido, Japan (MacNeil, 1955, pp. G13-14). In addition, MacNeil *(op. cit.)* has recognized *Mya salmonensis* Clark and a doubtful occurrence of *M. grewingki* Makiyama from the middle and upper parts of the

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