type of weevil, many mites of another group seem attracted to a quite different type of fungus.

Also occurring in the plant growth on the weevils' backs are nematodes and rotifers. A diatom was also found and undoubtedly other microscopic plants and animals occur in the plant growth. That some of the same weevils bear dead psocopterans in fair numbers, as well as their exuviae, suggests that these insects may have been feeding on the plant growth, probably on algae and fungi.

These weevils feed on the leaves of woody plants. They are most likely polyphagous. A mid-montane smooth species, *Gymnopholus weiskei* Heller, feeds on *Melia azedarach, Trema amboinensis, Pipturus argenteus,* and *Tephrosia candida,* representing four plant families. Another feeds on *Nothofagus*; another on *Laportea.* One of the new symbiotic species, defoliating *Rhododendron commonae* at 3500 m on Mt. Strong (*7*), bears extensive fungal and lichen growth.

Only a few of the female weevils show evidence of rubbing off of plants by action of males in mating. Perhaps the rubbing of the dorsal surface is largely confined to the posterior end of the sutural ridge and the apices of the posterior elytral tubercles, which rarely support plant growth.

Several genera of the weevil subfamily Cryptorrhynchinae in the same moss-forest environments also bear plant growth, predominantly of fungi and algae. One (Fig. 4) bears extensive growth of liverworts (Metzgerineae: *Metzgeria*; and Lejeuniaceae) (*4*), and one bears a lichen. These weevils have prominent tubercles or ridges which obviously protect the plant growth from being rubbed off.

All of these weevils are flightless. The wings of the species examined are vestigial in various degrees. The elytra are generally more or less strongly fused.

Some long-legged parasitic mites are fairly common on these weevils, generally on the ventral surfaces, although one of the smooth, nonsymbiotic species, *Gymnopholus gressitti* Marshall (*2*), sometimes has a mite attached immediately behind the large tubercle on each elytron.

This report may represent the first record of lichens and liverworts on insects and of algae on terrestrial insects (*8*). Hendrickson and Weber (*9*) reported lichens on Galápagos tortoises as the probable first record of lichens growing on living animals. Algal growth on the sloth is well known. Few records exist of nonpathogenic fungi other than Laboulbeniales growing on living insects (*10*), particularly on insects other than termites and ants (*11*).

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12. Supported by NSF grants (GB-518,3245) to Bishop Museum. Specimens were collected by W. W. Brandt, C. D. Michener, and ourselves. A few were taken earlier by Miss Evelyn Cheesman. She and the late Sir Guy Marshall, who studied her material and some of the early Gressitt and Szent-Ivany specimens (*2*), did not recognize the plant growth; nor did we until Sedlacek began to find individuals with conspicuous lichen growth. We thank R. K. Benjamin, S. Carlquist, G. W. Gillett, M. Hale, J. Proskauer, A. C. Smith, H. St. John, W. A. Weber, and J. Womersley for advice. Mites were mounted and sent to J. Aoki by W. J. Voss.

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Rabbit: Frequency of Suckling in the Pup

Abstract. *Rabbit does were given free access to their young, access once a day, and access twice a day. In all three groups the young were nursed only once every 24 hours. Growth curves for the pups from day 2 of age to day 30 were identical for all three groups. The restriction of suckling to once a day appears to depend on the mother and not the pups.*

Several aspects of maternal behavior in the rabbit have been described and subjected to experimental analysis (*1*). However, one characteristic which has not been systematically investigated is the frequency with which the mother nurses her young. Although reports in the naturalistic literature suggest that hares and rabbits may only nurse their young once a day (*2, 3*), this observation does not appear to be well known, and it has not been experimentally verified. The observation, however, is consistent with the findings of Cross and Harris (*4*), who removed the does from their week-old litters and periodically placed them with their young during the day. The doe nursed the pups only once a day, though the pups attempted to suckle more frequently.

Because of its unusual nature, we have attempted to examine this behavior in detail and to obtain both quantitative and observational data on suckling in rabbit pups from the day of birth. Quantitative data were the body weight curves of the young from day 2 of age to weaning, and observational data were obtained by close inspection of the mother and young throughout the day. We established three groups in which the doe was given (i) free access to the young, (ii) access once a day, or (iii) access twice a day. The individual pups of each litter were weighed daily from day 2 through day 16 and on days 19, 22, 26, and 30. The litters were all reduced to 4 to 6 in number. There were three litters in the "free-access" group, five in the "once-a-day" group, and four in the "twice-a-day" group. Dutch-belted rabbits were used.

Our general observations indicate that the doe nursed the young only once each day under both conditions in which the mother had access to the young more than once a day. In fact, during the second exposure under the twice-a-day condition the doe rarely entered the nest box containing the young or, if she did enter, she would leave immediately; hence she could not have nursed or contacted the young to any significant degree.

All the females in the twice-a-day group nursed in the morning and not in the evening. From the state of the young in the free-access situation (distended stomachs, often wet) it was presumed that these does also nursed early in the morning—that is, before the period when the young were weighed (8 to 10 a.m.).

Between 13 and 16 days of age

the young began to leave the nest box and their suckling was open to observation. When the young in the free-access group emerged from the box, the female would sometimes thump her hind legs and move into the box; the young would follow and start to suckle. At other times the female would avoid the pups for some minutes, then finally enter the box, the young following. Then she would nurse them. When nursing took place outside the nest box, suckling time varied from 2.7 to 4.5 minutes ($\bar{x} = 3.4$ minutes). Nursing in these cases was always terminated by the female, which simply moved away from the young. If the young still attempted to suckle, the female actively avoided them except on two occasions when the young did suckle for a short, second period during the morning feeding.

Under the twice-a-day situation, when the young were first old enough to leave the nest box, they would often attempt to nurse during the afternoon exposure to the mother. The doe would prevent suckling by jumping away or by lying flat against the cage floor so that the teats were not accessible. Thus it would appear that the restriction of suckling to once a day is due to the mother and not the young. From day 16 until weaning (day 30) the young would rarely attempt to nurse in the afternoon. This was also the period when the young began to eat solid food.

The data from the body weights were converted to daily gain, and the three curves are shown in Figure 1. Analysis of variance indicated lack of significant differences among the three groups. Examination of the curves in Fig. 1 reveals that considerable overlapping occurs. It is also of interest to note at least two separate rates of growth, depending on the age of the animal. Between the 2nd and 16th days of life the gain in weight was slightly less than twofold, while there was better than a tenfold increase between the 16th and 30th days. The critical point at 16 days of age is concomitant with the change in feeding habits noted above.

These experiments confirm the general observations that rabbits nurse only once a day. Contrary to the general procedure of feeding hand-reared pups every 2 or 3 hours (*5*), a once-a-day feeding schedule should give normal growth on a proper diet.

The rabbit would appear to present a situation not frequently reported in other mammalian species. In general, mammals appear to nurse with a much greater frequency. Indeed, the rat and mouse appear to nurse all the time. Do we then have an adaptation in the rabbit which aids in protecting the young from predators? The nest built by the doe for her young is completely covered, and lined with hair plucked from her body. It has been defined as the maternal nest and is under endocrine control (*1, 6*). The nest is well hidden from predators. If the doe has to visit the nest only once a day and if she spends only 3 to 5 minutes per day nursing, the chances that predators will find the nest and young are minimized. This behavior pattern also helps to explain why retrieval of pups appears to be absent in the rabbit (*7*). The young cannot easily escape from the nest until they reach a certain age and strength, and the doe nurses only once a day. Therefore, retrieval by the doe is not necessary for the survival of the young. It is of some interest to speculate on the evolution of the behavior patterns involved. It would appear that the endocrine-controlled nest building by the mother evolved first, followed by the once-a-day pattern of suckling (*8*).

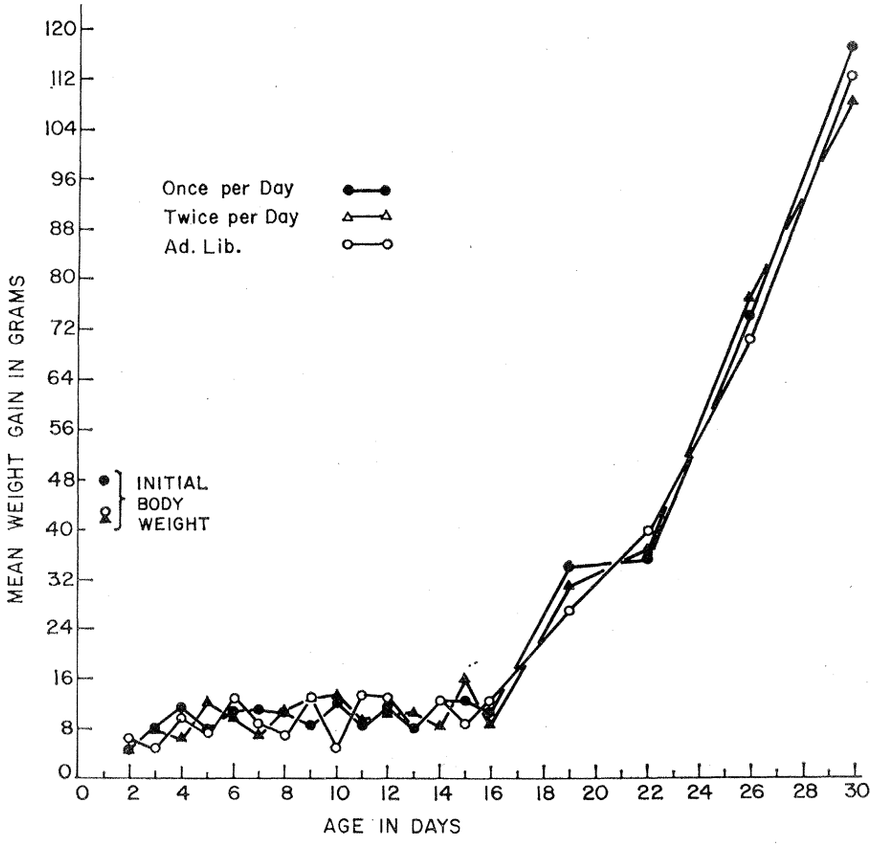

Fig. 1. Growth rates in Dutch-belted rabbit pups to which the doe had free access (open circles) or access either once (solid circles) or twice (triangles) each 24-hour period. The average daily weight gain is plotted against the age of the pups.

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