Fig. 2. A swarm which has attempted to move and found its queen missing may be led. The queen is confined in the cage which is being held aloft.

airborne within 1 minute. In four of the six cases, observations were made on the queen and her cage. From three to ten worker bees were moving in an agitated state over the cage during the entire time the rest of the swarm was in the air. The six swarms each occupied a space about 15 m (50 feet) in diameter when they were first airborne. In each case the swarm moved slowly away from the cross, but no swarm moved more than about 75 m (250 feet) from its cross; most moved only 15 to 19.5 m (50 to 65 ft). The largest swarm (estimated at 2.7 kg or 30,000 bees) remained away from its cross for 8 minutes, the smaller swarms 0.9 to 1.3 kg (2 to 3 lb) for 3 to 5 minutes. In each case the swarm dispersed over a greater area as it moved farther from the cross, in some cases covering an area 60 m (200 feet) in diameter. This dispersal took place because the queen was not in the air with the group; swarms with free queens move as a much more compact group. Once a swarm returned to the cross, it settled on the queen but not as rapidly as it had dispersed. In these experiments the swarms returned to normal within 15 to 25 minutes. In one instance the queen was taken from the cross while the swarm was in the air and placed on the ground 7.5 m (25 feet) from the cross. The swarm returned, no bees settled on the cross, and the queen was soon found by them. The vast majority of the bees was clustered on the ground around the queen 32 minutes later. In two cases a second cross was placed 1.5 m (5 feet) from the first while the swarm was in the air, and the queen was moved to it. In neither case did bees settle on the old crosses, all joined the queen.

The movement in the air could be studied by allowing the swarm to become airborne of itself, or by violently shaking the swarm off the cross into the air. When swarms were shaken into the air, usually only half of the bees became airborne, and the rest fell to the ground and soon formed small clusters. These clusters remained intact for only a few minutes (up to 25 minutes), and once individual bees became airborne, they rapidly joined the nearest cluster of bees whether it was their own or not.

Airborne bees could be led through the air by holding the queen aloft (Fig. 2). Attempts to lead naturally airborne swarms were successful only when the swarm was returning to the cross after a futile attempt to move without its queen. The bees also tried to settle and cluster on the person holding the queen, and this was prevented only by continual walking. The use of new cages showed that the queen herself and not the odor of her cage influences the swarm.

Workers clustered around and chewed filter paper on which queen bee heads, ground with a mortar and pestle, had been placed. In one instance, a swarm which was dispersed over an area about 60 m in diameter settled quickly when the mortar and pestle which had been used to grind several queen bee heads was brought into their midst.

Lindauer (*2*) determined that scout bees seek out information about suitable home sites and convey it to the swarm. It is not clear whether these same scout bees lead the swarm to its new location, or whether all the bees in the swarm are aware of their destination. This is possible in view of the data by von Frisch (*3*) which testify to the ability of individual worker bees to interpret properly the dance of scout bees. In any event, it is clear from the data presented here that a swarm of honeybees is aware of the presence of its queen, but that the queen does not lead the swarm to its destination (*4*).

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4. I thank Howard Myers of Sebring, Fla., for his help in performing these experiments; Richard Archbold of the Archbold Biological Station, Lake Placid, Fla., for the use of the excellent facilities and his assistance; and Dr. W. L. Brown, Cornell, for his comments on the manuscript. Supported in part by grant GM 10897-04 from the National Institutes of Health.

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Pogonophora on the New England Continental Slope

Abstract. *Two species of Pogonophora on the continental slope off southern New England are reported. Two species were found:* Siboglinum ekmani *Jägersten and* Siboglinum *sp., an undescribed species. The density of both species combined, at 366 m, was 30 per square meter and at 567 m depth, it was 25 per square meter. The dominant macrobenthic organisms with which they were associated were polychaete worms and foraminiferans.*

Recent benthic macrofauna collections from the upper continental slope 145 kilometers south of Martha's Vineyard, Massachusetts, contained 11 specimens of the phylum Pogonophora (*1*). Specimens of this rarely observed, tubicolous group of deuterostomes, sometimes referred to as beard worms, have not previously been reported from this region. The only other report of pogonophorans from the western North Atlantic Ocean is Bayer's account (*2*) describing fragments—astutely detected among other organisms—of *Siboglinum* collected near the edge of the continental shelf east of Florida. They were associated with the pennatulid *Stylatula* and polychaetes of the family Chaetopteridae.

Pogonophora were collected by the research vessel *Delaware*, 18 June 1962, by means of a Smith-McIntyre grab sampler (0.1 m^2). Samples were taken at two localities (stations 54, 39°59′N, 71°00′W; and 55, 39°56′N, 71°00′W) at depths of 366 and 567 m, respectively. The bottom water temperature for station 54 was 6.6°C and for station 55, it was 5°C. The bottom sediments were brownish olive in color; the texture was silt-clay at station 54 and silty sand at station 55. The median grain size was 0.08 mm and 0.16 mm for stations 54 and 55, respectively. A total of four grab hauls were made, two at each station; pogonophorans were present in each haul. Two species were represented: *Siboglinum ekmani* Jägersten and *Siboglinum* sp. The latter species

Table 1. Catch record (numbers) for Pogonophora collected from the New England continental slope on 18 June 1962. The combined density of *Siboglinum* sp. and *S. ekmani* at station 54 was 30 per square meter and at station 55 it was 25 per square meter.

Types	Station	
	54	55
Siboglinum ekmani		
Animals	1	3
Tubes	0	7 frags.
Siboglinum sp.		
Animals	5	2
Embryos	2	0
Tubes	6	0

is a new one and is now being studied by E. C. Southward.

The species *S. ekmani* has been reported from only two localities, both of which are in the eastern North Atlantic area—the Skagerrak (*3*) and southwest of Ireland (*4*). Thus, its occurrence in New England waters reveals a marked westward extension of its known geographic range. Catch records are much too scant to show geographic distributional patterns for individual species in this phylum. The records have so far disclosed little evidence of cosmopolitan or even ocean-wide distribution, which would generally be expected of bathyal species. Consequently, the records for *S. ekmani* from both sides of the Atlantic are an indication that future studies are likely to reveal widespread distribution for other species in this phylum.

Our specimens were collected from depths of 366 m and 567 m, which is somewhat shallower than the reported depth range of European collections of *S. ekmani*. The known depth range for this species in the Skagerrak is 487 to 650 m (*3*) and southwest of Ireland it is 620 to 1280 m (*4*). Since we did not sample deeper than 567 m, their maximum depth of occurrence in the New England region remains unknown. However, we have negative evidence indicating the minimum-depth boundary for both *Siboglinum* sp. and *S. ekmani* in this region is between 180 and 366 m. This evidence is based on the absence of pogonophorans in over 100 samples of benthic fauna from 64 stations uniformly spaced over an area of 12,000 square kilometers in the shallower water (35 to 180 m) adjacent to stations 54 and 55.

Quantitative information on members of this phylum is also sparse, and data given here are limited; however, the results from our samples are reasonably consistent. The catch records, as shown in Table 1, indicate a density of approximately 30 per square meter, both species combined, with *S. ekmani* only about half as abundant as *Siboglinum* sp. Total macrobenthos averaged 1700 specimens per square meter at station 54 and 700 at station 55. Although the numerical density of the pogonophorans was moderately low, these organisms were a significant component at the deeper station. Because of their moderately low density and small size (average diameter about 0.2 mm and length 10 cm), these species formed only a minor portion of the benthic biomass.

The principal organisms with which the New England pogonophorans were associated were generally the same at both localities. At station 54 the dominant organisms were: polychaete worms (Amphinomidae, Chaetopteridae, Maldanidae), foraminiferans (Astrorhizidae and Saccamminidae), and small sipunculoids. At station 55, which was deeper, the dominant organisms were: polychaete worms (Lumbrineridae, Capitellidae, Cirratulidae) and foraminiferans (Astrorhizidae and Saccamminidae).

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Epizootic Diarrhea of Infant Mice: Identification of the Etiologic Agent

Abstract. *Electron micrographs of intestinal epithelium of infant mice infected with epizootic diarrhea virus have demonstrated intracellular spherical structures measuring 65 to 75 mμ in diameter which have a complex morphology resembling several virus particles. They have ben interpreted as being the etiologic agent of this disease. The particles were present in association with, in some cases within, vesicles of the endoplasmic reticulum of intestinal epithelial cells. They were never seen in the nucleus.*

The disease which has come to be known as epizootic diarrhea of infant mice (EDIM) was first described in 1947 (*1*). Recent transmission experiments (*2*) have shown that this disease is infectious and communicable, and that the etiologic agent appears to be a fairly heat-resistant virus capable of serial transfer and susceptible of neutralization by specific hyperimmune rabbit antiserum. It is a highly contagious disease. It is widespread among mouse colonies and can thus be a potential cause of considerable difficulty in laboratories engaged in research on neoplasia and other viruses. Difficulty might be greatest where viral morphology is being studied in neoplastic tissues, for EDIM virus can infect adult mice without causing overt disease; viremia, however, may occur in such animals (*3*). It is thus possible that any organ may display EDIM virus particles when experimental mice come from a diarrheal colony.

In an attempt to obtain electron microscopic identification of the EDIM virus particle, 1- to 3-day-old mice were infected by oral administration of an appropriate dilution of purified infective intestinal filtrate. Within 1 day after onset of overt symptoms (3 to 5 days after exposure to the virus) the mice were killed, the small intestine was immediately exposed, and portions of the jejunum were fixed in osmium tetroxide. The tissues were then embedded in methacrylate, and sections were cut with a glass knife on a Porter-Blum type microtome for examination in an electron microscope (RCA EMU-2E). Normal tissue from uninfected mice of similar age was treated in identical fashion.

The technical methods used for the electron microscopy have been standard in this laboratory for the past several years and are described elsewhere (*4*). The methods of preparing, storing, and passaging the virus have been described in detail (*2*, *3*).

Figure 1 illustrates the typical appearance of the spherical particles found in the cytoplasm of the epi-