percent fewer alpha events in this energy region than does that of Surveyor V. Furthermore, the difference in the spectra appears to be mainly due to a difference in the titanium region (scattering from titanium extends to lower energies, thus also affecting the intensity in the calcium region). These qualitative differences are borne out by comparison of the least-squares results which show that the calcium abundances at the Surveyor V and VI sites are approximately the same, but that the Surveyor VI value for elements heavier than calcium is 4.9 instead of the 5.8 percent found by Surveyor V. This difference is ascribed to a lower value of titanium, with the value for iron remaining the same. Statistical analysis of the data from the two missions indicates that the titanium concentration at Sinus Medii is 0.48 ± 0.26 ($1\ \sigma$) of that at Mare Tranquillitatis.

The conclusions to be drawn from the results of Table 1 are similar to those given in preliminary reports on the Surveyor VI analyses: the relative amounts of the six most abundant elements (O, Si, Al, Ca, Fe, and Mg) are the same, within our error limits, at the two mare sites. This suggests that the composition of other lunar maria may be much the same with respect to these common elements. The composition at the two mare sites is different from that of the less volatile components of the solar atmosphere and that of terrestrial ultrabasic rocks or chondritic meteorites. The overall composition of the sample from Sinus Medii is more like that of common basalts than were the final Surveyor V results for Mare Tranquillitatis (*4*); this is due mainly to the lower Surveyor VI value for titanium. A basaltic composition for lunar surface material has been suggested on the basis of earth-based optical observations (*9*). However, the low sodium abundance, as in Surveyor V, is more consistent with that in eucritic meteorites (*10*) than with that in terrestrial basalts. The comparison made by Olsen (*11*) of the gross chemical composition at Mare Tranquillitatis with that of a rock whose composition is similar to that of the terrestrial anorthosites would seem valid also in the case of material from Sinus Medii. As we suggested in the preliminary reports, the principal minerals would appear to be feldspars and pyroxenes. The results from the examination of the Apollo 11 samples (*8*) suggest that the titanium in Sinus Medii may also be in the form of ilmenite. On the basis of the methods of Gault *et al.* (*12*), the estimated density of void-free lunar material at Sinus Medii is 3.09 g/cm^3.

Results from the Surveyor VII mission (*3*) showed that compositional differences occur across the face of the moon: the abundance of elements heavier than calcium at that highland site was lower by more than a factor of 2 than that found at the mare sites of Surveyors V and VI. The results reported here give evidence that differences in titanium concentrations occur from one mare site to another. Moreover, differences in some of the minor constituents can be inferred from these results on the major elements, now that preliminary analyses of returned lunar samples from the Apollo 11 mission are available (*8*). The Apollo results, which show good agreement with the Surveyor V analyses for Mare Tranquillitatis (Fig. 1), indicate that refractory elements such as titanium, zirconium, and yttrium are enriched, whereas alkali and volatile elements (including sodium, potassium, and rubidium) are depleted relative to terrestrial igneous rocks. Thus, the lower value of titanium at the Surveyor VI site suggests that other refractory elements, such as Zr, may be less abundant at Sinus Medii than at Mare Tranquillitatis. The Surveyor VI value for Na, which is nearly as low as that for Surveyor V, implies that other alkali metals are also depleted in the surface material of Sinus Medii.

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Lepidoptera in Cretaceous Amber

Abstract. *The discovery of the head capsule of a lepidopterous larva in Canadian amber of the Cretaceous period is the first fossil evidence of Lepidoptera before the Tertiary period.*

The head capsule of a lepidopterous larva has been discovered in Canadian amber of the Cretaceous period. Its presence there is evidence of the hitherto unrecorded existence of Lepidoptera before the Tertiary period (*1*). The find is neither surprising nor unexpected because Baltic amber has yielded not only adults of several families but larvae (*2*) that closely resemble larvae of extant species.

The amber examined was collected from the tailings of an open-pit coal mine near Medicine Hat, Alberta (*3*). It came from deposits that are at least 72 million years old (*4*). The piece containing the fossil (Fig. 1a) is about 10 by 11 by 3 mm. In addition to the head capsule, it appears to have webbing within it, also some frass in an area that might have been a skeletonized part of the host plant, and more frass in what might be the remains of a tunnel in crumpled leaves. In other words, the larva that shed the head capsule apparently fed in a concealed habitat typical of that of many present-day Microlepidoptera.

The head capsule (Fig. 1, b and c) is about 0.58 mm long, and is not

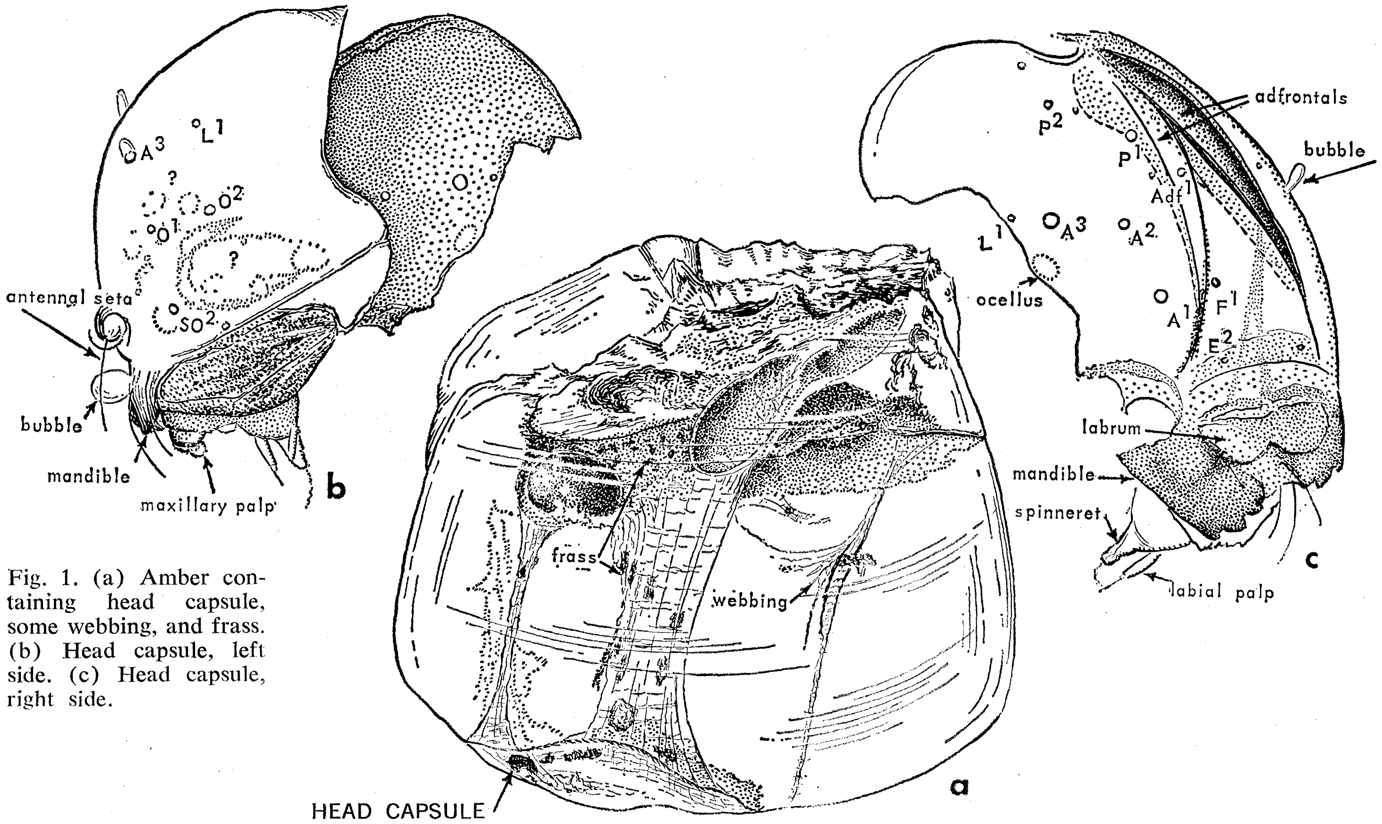

Fig. 1. (a) Amber containing head capsule, some webbing, and frass. (b) Head capsule, left side. (c) Head capsule, right side.

entire; two small pieces that lie nearby may be part of it. It appears to be split along the left adfrontal suture and the sides crushed together so that the left adfrontal is actually overlapped by the remainder of that side. Pressure has formed bubbles at some setal openings as illustrated. The positions of setae E^2 and the right seta F^1 on the frons are distinct, as are those of A^1, A^2, A^3, L^1, P^1, and P^2 on the right side. A cleared area anteroventral to A^3 on the right side could be ocellus I or II, probably the latter. On the left side, ocelli cannot be definitely distinguished, and the identity of the setal bases observed are doubtful. Seta L^1 appears to be farther from its corresponding seta A^3 on the left side than on the right side. If these setae are correctly identified, the difference in distances can be explained by light refraction. Other structures observed are the spinneret, which appears to be short, somewhat tapered toward the apex, with an apical silk pore; a labial palp; a maxillary palp; the labrum, with anterior margin emarginated and sides of notch forming an angle of slightly less than 90°; mandibles, which, in one view, show teeth more pointed than illustrated; and, lastly, what appear to be antennal and mandibular setae.

The distinct adfrontal sclerites are diagnostic of Lepidoptera. These sclerites are never found on larvae of other orders (*5*). The labrum, the opposable mandibles, the spinneret, and labial palp are also typically lepidopteran in shape. The apparently long adfrontals extending to the back of the head, the position of the setae, in fact, the overall appearance of the head capsule are characteristic of many Microlepidoptera. Some indication of family relationship might have been obtained from the number, comparative size, and arrangement of the ocelli if the ocelli could have been observed. But even an attempt to fit the small adjacent pieces, one of which seems to show at least one ocellus, into the missing areas of the capsule was not successful. If there are actually fewer than the usual six ocelli present, a possible tineid connection could be suggested. Unfortunately, the family to which the head capsule belongs cannot be determined with certainty.

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Elm Bark Derived Feeding Stimulants for the Smaller European Elm Bark Beetle

Abstract. *The principal feeding stimulants for the beetle* Scolytus multistriatus *Marsham from the twig bark of* Ulmus americana *L. have been identified as (+)-catechin-5-β-D-xylopyranoside and lupeyl cerotate.*

The selection of a host by phytophagous insects results, in many cases, from the presence of specific chemicals in that host (*1*). The occurrence in elm of chemotactic factors, as well as thigmotactic stimuli, that induce feeding in *Scolytus multistriatus* Marsham has been indicated (*2, 3*). We report here