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T E K T I T Y

by

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[USA]

Translation of the Introduction
by E. L. Krinov
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T E K T I T Y

PREFACE

By the Editor of the translated edition of the book by Dr. John A. O'Keefe, entitled Tektites

The small glassy formations, preserved in large quantities in numerous world collections of meteorites, are known under the denomination of tektites. They have the most diversified shapes: round, oval, pearl-like, cylindrical and so forth. When looking at them against light, one may notice in the thin plane parts of separate specimens, a green, brown or yellowish coloring, making them look like the ordinary dark bottle glass. Most of the tektites have dimensions of a hazel nut and weight in tens of grams. The coarsest ones reach the size of a chicken's egg and a weight to 0.5 kg.

At first, tektites having been called moldavites were found in the western part of Czechoslovakia (in Southern Bohemia and Western Moravia). The exact time of their finding has not been ascertained; it is known, however, that they were encountered by local natives as early as in the second half of the eighteenth century.

Subsequently, tektites were also detected in other parts of the terrestrial globe: on the island of Tasmania (tasmanites), in the Central and Southern Australia (australites), on the Billiton Island (Indonesian Archipelagos), in the Philippines (philippinites or risalites), in Indochina (indochinites) and also in West Africa and North America. They were all found to be similar to moldavites, differing from them only by the coloring, when looked upon through light. It should be noted, however, that despite its enormous territory, not a single tektite has been found to-date in the Soviet Union. This is probably explained by the fact that in our country very little and even practically nothing is known about tektites.

Despite the fact that tektites have already been known for a sufficiently long time, the question of their nature is still unresolved, and the discussion of their origin is still under way at the present time. Some researchers, however, consider them to be peculiar glassy meteorites, while others negate their cosmic origin and consider them as terrestrial formations. One must say that until very recently tektites drew the attention of only very few scientists. The situation changed abruptly in the course of the last few years. This

began with the reports on special symposia on tektites held in Washington (1957), New York (1963) and also at the Florence (1961) and Washington (1962) Cospar Symposia, during which the audacious hypothesis was brought forth that tektites are fragments of the Moon's surface layer, ejected during the fall on the Moon of sizeable meteorites.

It should be stressed that quite reasonable foundations were laid at the basis of this hypothesis. The low critical velocity for the Moon (of the order of 2 km/sec) and the absence of atmosphere lead to the fact that when sufficiently coarse meteorites fall on the lunar surface (the impact velocity for meteor bodies meeting head-on may exceed 70 km/sec), the fragmented and pulverized fragments of the Moon's surface layer acquire speeds above the critical velocity and escape the sphere of gravitational action of the Moon. Part of them will unescapably hit the Earth's gravitational sphere and at the very end enter the terrestrial atmosphere, decelerate and probably fall on the ground. Tektites may precisely be those fragments of the Moon's surface layer having undergone modifications on account of the impact and atmosphere modeling. Therefore, if this hypothesis is valid, by investigating the chemical composition of tektites, we in essence carry out the study of the matter of the lunar surface.

Resting upon the fact that no tektite falls were observed to-date and considering impossible the conservation of glassy or glass-like formations at deceleration in the Earth's atmosphere, the adversaries of this hypothesis relate the origin of tektites with the so-called silica-glass (or impactites), found in meteoritic craters in the form of pieces of glassy matter, having emerged during the impact melting of the terrestrial silica-sand during the falls of crater-forming meteorites. It should be mentioned that contrary to tektites, the fragments of silica-glass always have an irregular, fragmental shape and are either painted in light yellow color or are generally colorless. At the same time, the partisans of this viewpoint agree with the idea that the origin of tektites is somehow linked with the impacts (on the Earth or on the Moon).

The above referred to reports have stimulated the study of tektites by scientists of numerous lands of the world, and the number of published works devoted to tektites sharply increased. Nevertheless, it cannot be said that enough attention is presently being given the tektites by researchers of the Soviet Union. The decisive word in the problem of tektites undoubtedly belongs in contemporary geochemical methods, and first of all, in the establishment of the exact isotopic composition of tektites, the determination of their age by the potassium-argon method, and the aerodynamic analysis of conditions of entry into the atmosphere and shape-modeling of tektitic bodies.

This is why the edition of a symposium of works on tektites, published in the United States in 1954 by John O'Keefe, one of the leading NASA specialists, appears to be quite timely.

The object of the symposium, its problems and principles of composition, are sufficiently fully characterized in O'Keefe's preface, and this is why we shall limit ourselves here only to a brief enumeration of the works entering into the book.

Chapter 1, written by J. Baker, is devoted to the shape and the sculpture of tektites. In Chapter 2, V. E. Barnes considers the fields of tektite scattering. Chapter 3, belonging to E. Chao, acquaints the readers with the petrography and chemical properties of tektites, and Chapter 4, written by C. C. Schnetzler and W. H. Pinson, presents the tektites' analytical chemistry. In Chapter 5, I. Friedman describes the physical properties of tektites and J. Zahringer considers in Chapter 6 their isotropic composition. Chapter 7 is devoted to the problem of aerodynamic analysis of tektitic shapes (E. W. Adams). Chapter 8, written by J. A. O'Keefe, gives a critical analysis of the merits and shortcomings of various hypotheses relative to the origin of tektites. Finally, in the concluding Chapter 9 belonging to A. J. Cohen, the fields of moldavite scattering in the light of hypotheses on tektites' origin are considered in detail.

Thus, the symposium provides a sufficiently complete picture of the contemporary state of the problem of tektites.

In conclusion, a few words about the circle of readers of this book. It will be indispensable, first of all, to specialists—astronomers, geochemists, geologists, taking interest in extraterrestrial matter and its terrestrial manifestations. A large amount of valuable material will be found here also by specialists in aerodynamics, working on the problem of entry into the atmosphere with cosmic velocity and the atmospheric braking at high speeds. The book, however, will also be read with interest by representatives of a broader circle of readers showing interest in literature devoted to meteorites. One may be assured that these readers will face with interest a book devoted, according to its creators, to the attempt of knowing what tektites really are.

It would be also desirable that this book provide the incentive for the detection of tektites on the territory of our country and stimulate the development of tektite research in the Soviet Union.

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