ASTROBLEME ORIGIN OF THE EUROPEAN BLACK SEA AND THE CASPIAN SEA

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The propositions put forward below are of the nature of theme-declarations. The author has been carrying out research in this field since 1968 and it is planned to continue the investigations in the future too. Even in the present stage of the research, however, the part-results obtained confirm the working hypothesis to such an extent that it is justified to publish them, together with an account of the research trends on which geological, geographical, geophysical, geochemical, mineralogical, etc. data collections and evaluations are at present being performed to prove the correlations. The author would like to make use of this opportunity to ask for assistance from all those who can contribute towards the confirmation of the propositions with original experimental material, and requests that information on such material be sent to *Prof. L. Jakucs, Department of Physical Geography, Szeged University, H—6722 Szeged, Egyetem u. 2—6. Hungary.*

He is fully aware of the fact that there is a need for objective associates free from the prejudices of the traditional schools. A series of examples indicate that, even in the modern scientific world, to progress from the announcement of new scientific facts to their professional acceptance at times demands some effort, and may be the more drawn-out, the more commonplace and obvious the new facts and the more their scientific importance.

Logical starting-point I

It is a confirmed fact that, during long periods even on a geological scale, collisions with cosmic masses of various dimensions have given rise to surviving astroblemes on the surfaces of celestial bodies of the solar system not possessing a water cover, and only partially ensheathed by gas; these astroblemes are mainly observed in the form of impact craters of different sizes and mountain rings encircling such craters. Impact craters several hundred or even several thousand kilometres in diameter may be discerned and measured on the surfaces of the Moon, Mars, Mercury and some other more well-known celestial bodies. There is no reason to assume, therefore, that our own planet, the Earth, has never been involved in collisions with asteroids of similar magnitude in the course of its development over several milliard years. Quite the contrary: the scientific fact is that the Earth, as a planet of the solar system, has been and still is exposed to periodic collisions with planetoids and other larger meteorite-like masses, just as other planets and moons of our solar system. *The formation of astroblemes in therefore a regular and recurrent characteristic of the develop-*

ment of celestial bodies. The atmospheric sheath of the Earth is practically unable to retard or moderate the collisions of bodies of large magnitude (several kilometres in diameter) arriving with cosmic velocity differences (10—30 km/sec). Accordingly, such collisions have of necessity created gigantic astroblemes in the surface of the Earth's crust. The counter-argument, that the surface of the Earth is nevertheless not covered with a multitude of smaller or larger astroblemes, is a weak one. The relative absence of impact forms is only apparent, and stems from the facts that typical weathering and planation movement processes (the destroying, transporting and sediment-accumulating activities of water, wind, ice and the living world) operate in the geographical sheaths, and that these eliminate or transform the earlier-produced forms. It is obvious, however, that geomorphology must reckon with the terrestrial occurrence not only of small, but also of gigantic astroblemes, or their more or less distorted remnants. On the basis of cosmic analogies it cannot be refuted that craters of impact origin may include such large basin-like formations as the North American Hudson Bay and the Gulf of Mexico, the African Congo Basin, or the basins of the European Black Sea and Caspian Sea.

Logical starting-point II

If a giant impact crater happens to have been formed in the area of an active orogenic belt, where the mountain-forming tangential pressures result in the piling-up and spatial shortening of the local crust, then the crater basin, which was circular on its formation, is subsequently deformed and its axis perpendicular to the chain direction is shortened; that is, it is compressed into a crescent-shaped, *extended residual basin.* Later still, as a consequence of the orogenic, chain-direction spatial shortening, the originally facing walls and cyclic mountain chains of the crater may possibly be piled up completely against one another, and hence the basin will be eliminated.

Main proposition I

The basin of the European Black Sea is not a product of the tectonics of the Alpida orogenetic belt, but is a basin formation with a genesis different from the crustal movements giving rise to the Alps — Caucasus — Himalayas mountain system stretching throughout Eurasia: it is a gigantic astrobleme, i. e. the remnant of a crater-like formation blasted our by the impact of a cosmic body, its basic shape being subsequently distorted by tectonic events.

Main proposition II

The southern semi-basin of the European Caspian Sea is not a product of the tectonics of the Alpida orogenetic belt, but is a basin formation with a genesis different from the crustal movements giving rise to the Alps — Caucasus — Himalayas mountain system stretching throughout Eurasia: it is a gigantic astrobleme, i. e. the remnant of a crater-like formation blasted out by the impact of a cosmic body, its basic shape being subsequently distorted by tectonic events.

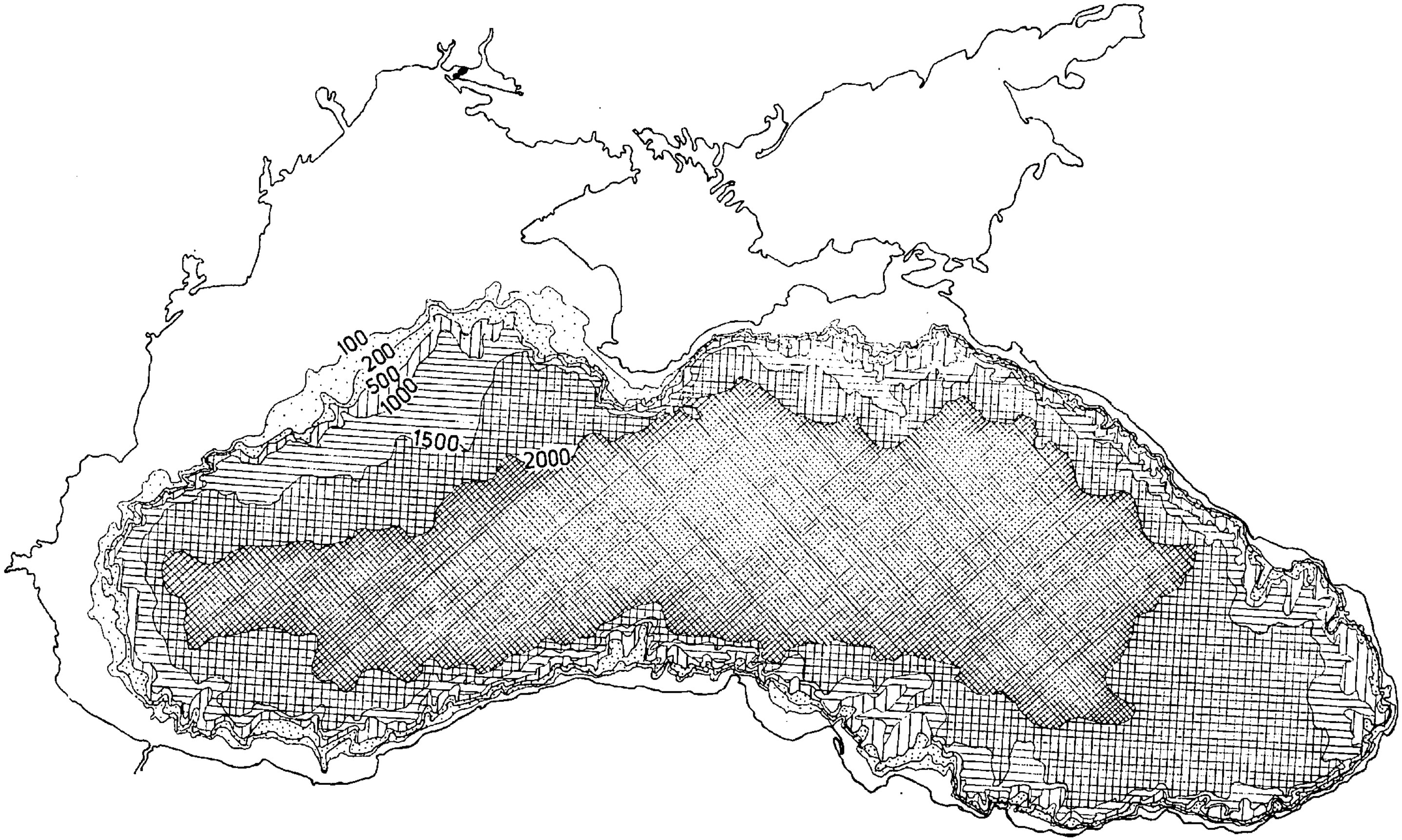

Fig. 1. Isobathic (bottom-relief) map of the Black Sea.

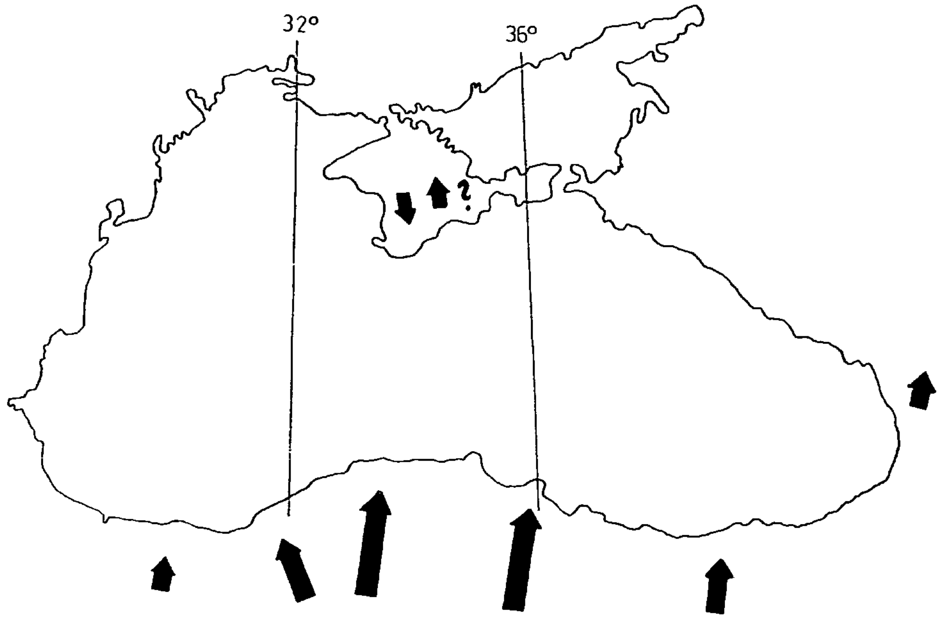

Fig. 2. Direction and extent of the recent tectonic shore-line movements of the Black Sea. The lengths of the arrows are proportional to the degrees of shore displacement in unit time.

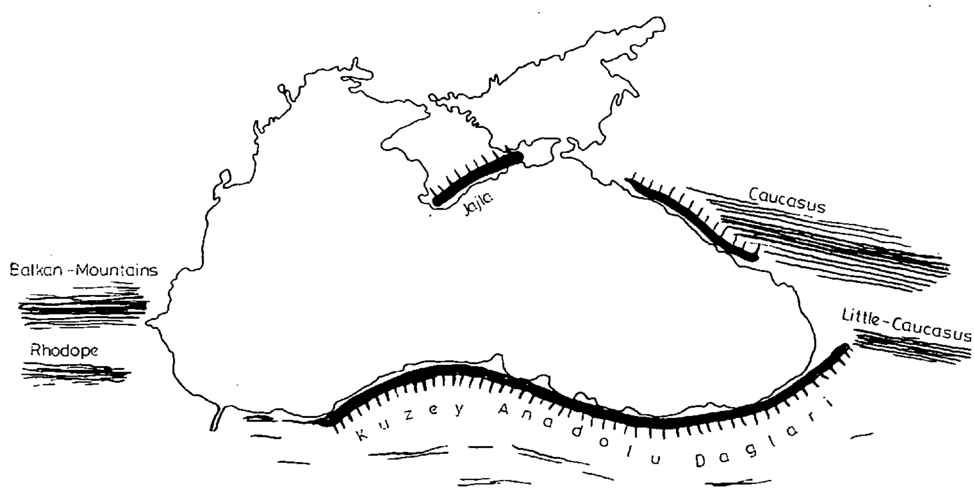

Fig. 3. Correlation of the chain directions of the mountain ranges bordering the Black Sea with the shore directions. Mountains with a chain concordant with the shore line (Yayla, Pontine Mountains) are in part impact circular mountain remnants, while ranges with a discordant chain (Balkans, Rodope, Caucasus, Lower Caucasus Mountains) are traditional chain mountains formed in a laminar tectonic congested belt.

Note: Besides the above two main propositions, the author is also examining the possible impact origin of other large formations:

a) The Hudson Bay (America)
b) The Gulf of Mexico (America)
c) The Caribbean Sea (America)
d) The Congo Basin (Africa)
e) The Sea of Marmora (Europe)
f) The Carpathian Basin (Europe)

Thematic groups of facts and observations supporting main propositions I and II

1. The present shapes of both the Black Sea and the southern semi-basin of the Caspian Sea can be well interpreted from previously circular giant craters, in that the original circular form was degenerated formally postgenetically by laminar tectonic block pile-ups. (Fig. 1.) As a consequence of the underdrift of the African and Arabian blocks in a northerly direction, the southern shore-line of the synorogenically produced Black Sea crater was later forced in towards the centre of the crater and thus *shore-line inversion* occurred. The *Pontine Mountains* are thus to be explained essentially as a crater-edge circular mountain range arcing in a southern

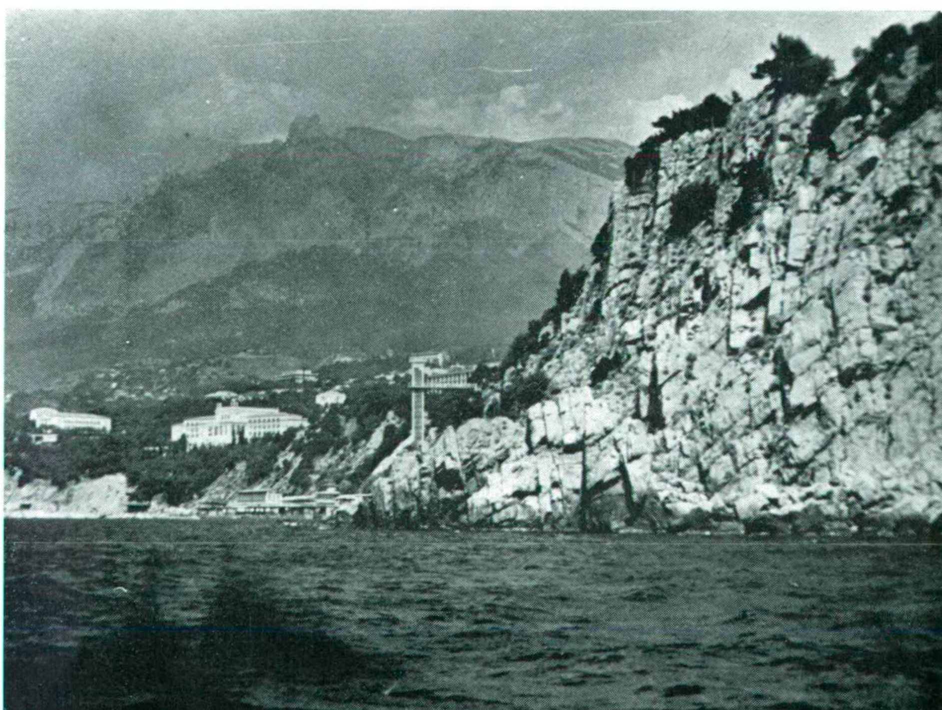

Fig. 4. Detail of the south-eastern shore line of the Crimean peninsula at Alupka, originating from a crater side.

direction at the time of its formation; later this gradually straightened out, and later still became a mountain chain arcing in a northern direction. In the meantime, of course, its tectonics were further formed by the discrete characteristics of the movements of the orogenic belt.

The *Elburz Mountains* on the southern edge of the Caspian Sea are also the remnants of a circular mountain range produced in part by impact crater formation; howeever, its chain-direction axis of curvature has been less deformed since its formation.

Fig. 5. Detail of the "Chaos" stone sea at Alupka. Similar stone seas are formed from slope slips or from frost-caused diminution, but here the morphological and climatic conditions of the site exclude both genetic factors.

2. Indirect evidence of the earlier circular form of the Black Sea basin is the fact that the *distances* between the northern shore of the Black Sea (Crimea) and its southern shore in Asia Minor (Inebolu, Samsun) *are at present too becoming permanently shorter*. The shortening of the distance between the northern and southern shore lines per unit time is the most extensive around longitudes 32—36° E, and moderates progressively on proceeding either east or west of these meridians. (Fig. 2.)

3. The *Balkans Mountains* are interrupted at the eastern shore of the Black Sea, but the *Caucasus* mountain chain continues from the western shore of the Balck Sea, with a geological structure similar to that of the Balkans Mountains. However, the

mountain link connecting the two ranges is missing. In its place is situated the basin of the Black Sea, but geophysical measurements and sea-bottom drillings indicate that the missing connecting mountain chain *is not present even on the sea bottom*. (Fig. 3.)

4. Analogously to the phenomenon in point 3, the *Caucasus Mountains* are interrupted (at Baku) on the western shore of the southern basin of the Caspian Sea, and the orogenic chain of the *Kopet-Dag* on the eastern shore, while the one-time mountain chain connecting the two mountain ends is missing. Nor can rocks of the missing mountain chain be found in the geological formations of the bottom of the Caspian Sea, and thus it is not possible that these sections of the Alpida mountain chain, which stretches across the whole of Eurasia, sank into the depths in the course of the postorogenetic tectonics.

5. The *Yayla Mountains* on the Crimean peninsula are *one of the most intact remaining details of the wall of the impact crater* forming the basin of the Black Sea. (Fig. 4.) The characteristic morphology of the Yayla Mountains decisively proves the impact crater origin of the Black Sea. The steep southern wall slopes of the mountains (as can be seen most typically on the *Alupka—Yalta—Alusta* shore line)

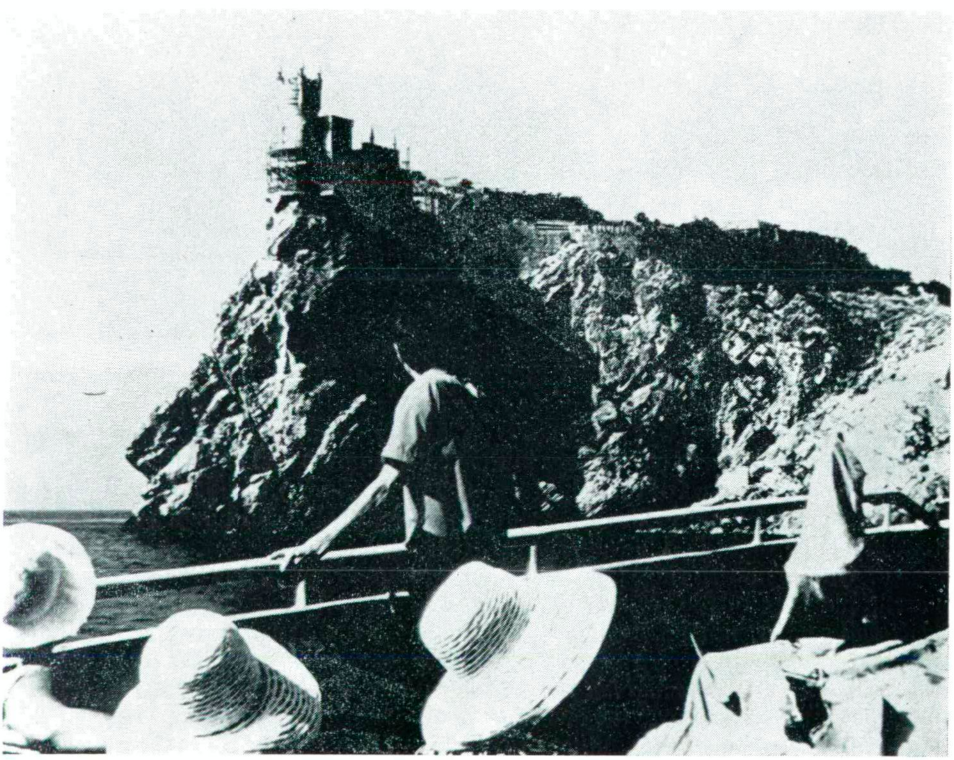

Fig. 6. Rock layers piled-up and counter-falling due to the crater-forming energies in the shore line of the Crimean peninsula, in the vicinity of Yalta.

Fig. 7. One of the most intact remaining details of the crater wall of the Black Sea, in the vicinity of Alupka. The counter-falling limestone cuesta towers broken up and piled up high by the impact energy can be well seen on the ridge line of the Ay-Petri (1233 m).

still reveal the wall properties characteristic of the giant crater. In the side of the crater facing the sea one can observe a series of almost vertical wall details, block-seas of *mechanically crushed rock masses* ("Chaos"), (Fig. 5.) *forced-back and upwards-leaning, counter-falling layer endings* in the walls, (Fig. 6.) and *piled-up, crest-like rock towers* on the edge lines of the ridge (e. g. *Ay Petri*) (Fig. 7.), while the northern slopes of the same mountain incline only slowly and gradually and adapt to the flattisch terrain of the plain beside the Dnieper. (Fig. 8.)

6. On the flattish ridges of the Yaylak Mountains (e. g. on the northern sloping karstic plateaux of the *Chitir-Dag*) there are large, wide, but inactive *defunct river beds and valleys,* not possessing water-catchment areas; these proceed in roughly northerly directions from the southern edge lines of the mountain (away from the sea.) These river beds *could not have formed* under conditions similar to the present ones. Their presence proves the one-time existence of earlier extensive water-catchmen surfaces to the sout of the southern ridge line of the Yayla Mountains (in the place of the present sea), but today there are no such water-catchments anywhere. (Fig. 9. 10. 11.)

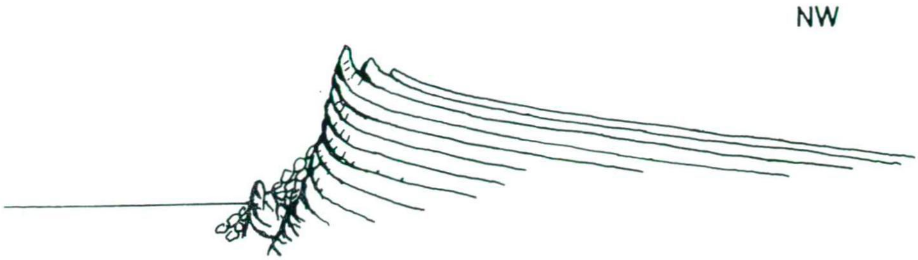

Fig. 8. General mountain-structural scheme of the mountainous region adjacent to the shore of the Crimean peninsula.

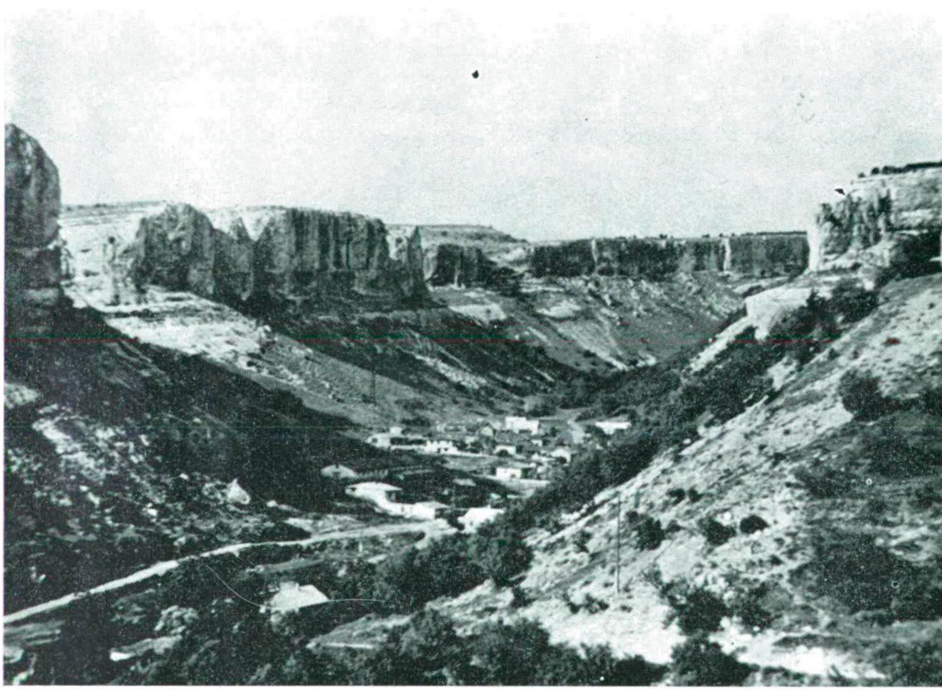

Fig. 9. Large dry river valley not possessing an active watercourse or a water-catchment area of sufficient size to justify the state of development of the valley; on a mildly sloping karst plateau of the Crimean peninsula.

7. Our on-site investigations in the steep cliffs of the slopes of the Yayla Mountains facing the Black Sea revealed the mineral *coesite* (in the vicinity of Alupka), which, according to the literature on astrobleme research, is in itself decisive mineralogical proof of impact genetics.

Manuscript submitted: 2 March 1976.

Fig. 10. Fluvial erosional rock terraces in the side of the defunct Shchufut-Kale river valley (in the vicinity of Bakhchiseray).

Fig. 11. Developed corrasional bed formations on a karstic plateau of the Chitir-Dag on the Crimean peninsula, at a height of about 1100 m above sea-level. Today no water-catchment area at all belongs to the developed river bed to be found in the immediate vicinity of the Yayla ridge, for earliter this was in a mountain rising in the place of the present sea basin. (This phenomenon is a typical example of bathycapture caused by an astrobleme.)