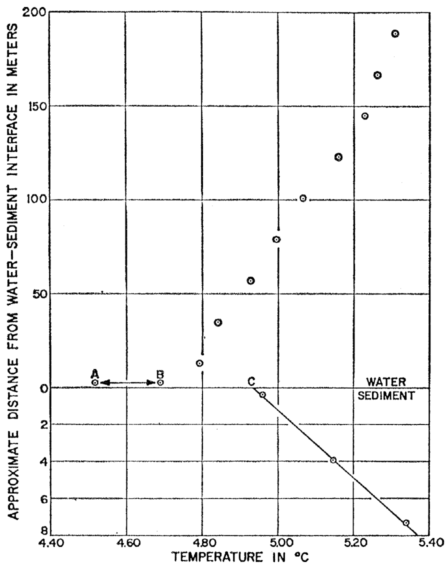

Fig. 3. Temperature versus distance from the water-sediment interface below C7-2.

ference could result from a small electrical resistance in series with the thermistor.

The variation of temperature with time in the near-bottom water (Fig. 1) was probably a manifestation of internal waves. If the normal temperature gradient was present, this range of variation would represent vertical motion of 100 m. Because of the boundary conditions internal waves of such amplitude are impossible so close to the bottom; moreover, the observed frequency was higher than would be expected in the nearby homogeneous deep water of the Caribbean. However, high-frequency internal waves can occur with the large temperature gradient observed in the lowest 13 m, which fact would explain the temperature fluctuations.

The observed cold bottom water must be a transient feature. Hurricane Edith passed within 2 deg. north of C7-2 only 3 days before the measurements were made; the passage of the hurricane may be related to these observations. Leipper (*4*) has reported great upwelling of water during passage of hurricane Hilda through the Gulf of Mexico; he believes that a 150-m vertical migration of water may have occurred at depths below the Ekman Layer. The cold water layer over the Aves Ridge may have been a residue of deeper cold water that moved up the flanks of the ridge during the passage of the storm. A second possible relation to the hurricane may derive from its initiation of large internal waves: impinging on the ridge, these waves would break and form a "surf zone" on top of the ridge, resulting in the thin layer of much colder water near the bottom and short period oscillations. The breaking of internal waves as they pass over areas of decreasing depth has been reported (*5*). Cooper (*6*) hypothesized a similar mechanism to explain nutrient-rich water on the continental shelf of the western English Channel.

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Dislocations in a Campo del Cielo Meteorite

Abstract. *Thin-film transmission electron microscopy showed that a Campo del Cielo meteorite has an immobile dislocation network of high density. The network is not related to attendant precipitates.*

Recent studies of the nature of the distributions and configurations of dislocations in metallic meteorites have revealed an interesting situation in a section of a Campo del Cielo meteorite. Slices were spark-machined from the bulk specimen and were thinned with a saturated solution of anhydrous sodium chromite in acetic acid as electrolyte. Selected areas were examined by transmission electron microscopy (Philips E.M. 200); micrographs were taken from areas 1-μ square.

Diffraction patterns showed that all the areas examined were the body-centered-cubic (bcc) α or kamacite phase. Figure 1 shows a typical area containing dislocations and precipitation particles. Although the dislocation density is high (about 10^9 cm^{-2}), the general appearance is not that of a plastically deformed bcc metal, despite the fact that, under optical examination, extensive deformation effects such as Neumann bands, flow zones, and fractured inclusions are observed. (For example, compare this micrograph with the deformation structures observed in vanadium by Edington *et al.*, *1*.) It is evident from Fig. 1 that none of the dislocations is held up by precipitates, as would be expected if they had been introduced by plastic deformation. The indication is that these dislocations were not generated by impact. On the other hand, none of the precipitates have grown at or along the dislocations—that is, if the precipitates were nucleated after the generation of the dislocations, then there was no elastic attraction between the dislocations and the precipitate atoms. An explanation for this is that the dislocations contain a sufficient concentration of foreign atoms to neutralize their strain fields, but that the concentration is too low to be resolved by the electron microscope. Figure 2 shows an area at high magnification; although no precipitates are seen on the dislocation lines, the lines sometimes have a jagged appearance which could be indicative of dislocation pinning.

There is little or no strain contrast surrounding the precipitate particles. This means that there are no strains due to coherence or to differential thermal expansion that occurred between precipitate and matrix during cooling. Also, the absence of dislocation loops near the precipitates shows that there has been no need to relieve strain by "punching out" prismatic dislocations. All of this evidence indicates that the precipitates were formed during the cooling of the meteorite at a very slow rate. The question of how such a slow cooling rate can be compatible with the observed high dislocation density which, in the foils so far examined, is of the order of at least 10^9 dislocation lines per square centimeter can be answered in part by considering the nature of the dislocations.

In Fig. 2 the foil plane is (201) and the long dislocation lines which, because of their length, must lie in or nearly in the foil plane, are parallel to the $[\bar{2}11]$ direction. Now $[\bar{2}11]$ is the intersection of $(0\bar{1}1)$, a normal bcc slip plane, with the foil plane. Conse-

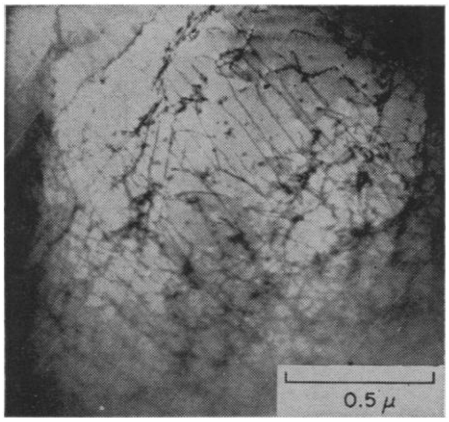

Fig. 1. α-Phase. The foil normal is (201).

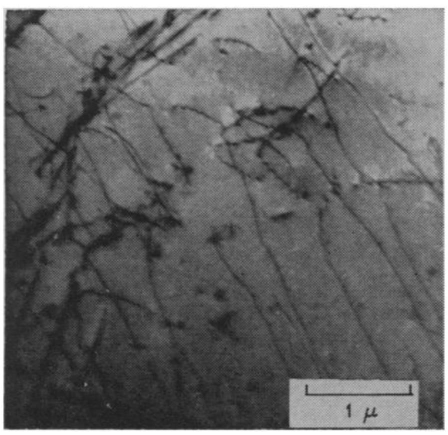

Fig. 2. α-Phase, showing long dislocation lines lying in {110} planes.

quently, the dislocations must be normal slip dislocations and not prismatic dislocations. Further evidence that the dislocations are very strongly pinned is that they did not move during thermal stressing in the electron beam, even though the sample was eventually heated to the melting point. Therefore the dislocations must have originated by multiplication during slip and not merely by, for example, point defect condensation. That plastic deformation must have occurred during the γ- to α-transformation is strongly indicated, and it is probable that such deformation preceded formation of the precipitate.

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Conversion of p,p′-DDT to p,p′-DDD by Intestinal Flora of the Rat

Abstract. p,p′-*DDD [1,1-dichloro-2,2-bis*(p-*chlorophenyl)-ethane] occurs in the feces and livers of rats that are given* p,p-*DDT [1,1,1-trichloro-2,2-bis-(*p-*chlorophenyl)-ethane] by stomach tube, but not of rats injected intraperitoneally with* p,p′-*DDT. Coliform bacteria, isolated from feces of control animals, can effect reductive dechlorination of* p,p′-*DDT to* p,p′-*DDD. These findings indicate that the normal flora of the gastrointestinal tract, rather than the liver, as others have suggested, is the major source of the* p,p′-*DDD that is found in animals fed* p,p′-*DDT.*

When *p,p′*-DDT [1,1,1-trichloro-2,2-bis(*p-chlorophenyl*)-*ethane*] is administered to rabbits (*1*) or rats (*2*), either by stomach tube or in the diet, both *p,p′*-DDD [1,1-dichloro-2,2-bis (*p*-chlorophenyl)-ethane] and *p,p′*-DDT are found in the liver. Although it has been suggested that *p,p′*-DDT is converted to *p,p′*-DDD in the liver, there is no concrete evidence for the liver being the site of conversion. We have obtained evidence that the reductive dechlorination of *p,p′*-DDT to *p,p′*-DDD takes place in the gastrointestinal tract of rats and results from bacterial action.

Twenty adult male and female Osborne-Mendel rats, raised to maturity on a semisynthetic diet low in chlorinated pesticide residues, weighed from 182 to 354 g. Control (eight animals) and test rats (two groups, each of six) were matched according to sex and weight. *p,p′*-DDT (dissolved in corn oil, 2 mg/ml) was administered to the test animals at the rate of 4 mg/kg, either by stomach tube or by intraperitoneal injection. Feces were collected for 48 hours; the animals were then killed and the livers removed. Feces and livers were extracted by grinding with sand and ethyl ether in a mortar with pestle; the final volume of the ether extracts was 50 ml.

Cultures of *Escherichia coli* and *Aerobacter aerogenes*, isolated from control-rat feces, were maintained on 3-percent trypticase soy agar slants (*3*). The cultures were used to inoculate flasks containing 250 ml of sterile 3-percent trypticase soy broth to which 200 μg of *p,p′*-DDT in 0.1 ml of acetone was added. After 24-hour incubation at 37°C, the cultures were extracted twice with equal volumes of ethyl ether by shaking for 2 minutes in a separatory funnel; the combined extracts were reduced to 50 ml on a steam bath.

Portions of the ether extracts of livers, feces, and cultures were cleaned up by evaporating them to dryness on a steam bath, dissolving the residues in petroleum ether, extracting with acetonitrile and reextracting with petroleum ether, and chromatographing the extracts on Florisil (*4*). The purified extracts were then analyzed by gas-liquid chromatography by the method of Klein, Watts, and Damico (*4, 5*).

Representative gas chromatograms of extracts of feces are shown in Fig. 1. The major chlorinated-pesticide residue found in the feces of rats receiving *p,p′*-DDT by stomach tube was *p,p′*-

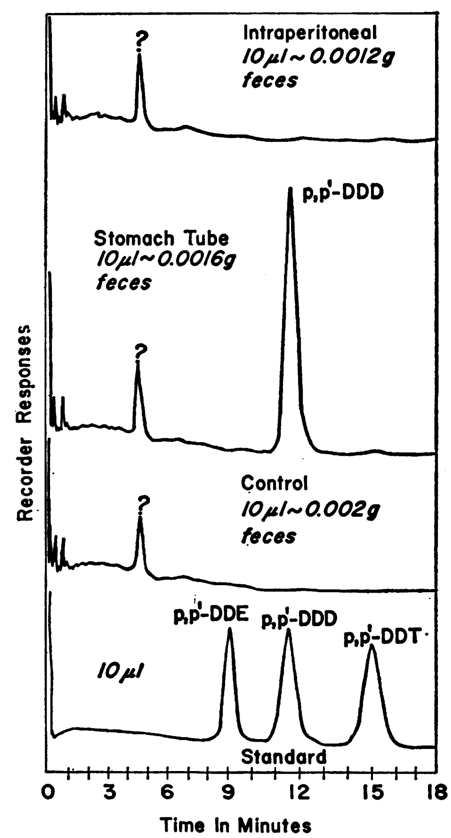

Fig. 1. Representative gas chromatograms of extracts of feces from a control rat and from rats given *p,p′*-DDT by stomach tube or by intraperitoneal injection. The standard solution contains 0.20 μg of *p,p′*-DDT, 0.20 μg of *p,p′*-DDD, and 0.10 μg of *p,p′*-DDE per milliliter of isooctane.