servations of TEH in later *H. erectus*, and Paleolithic *H. sapiens*, seem to indicate a much lower prevalence, and support the hypothesis above. However, at least certain populations of Neanderthals presented a high frequency of the lesions [7], a fact which may contribute to understanding their evolutionary fate.

My observations on *Paranthropus* teeth indicate a low prevalence of only very mild TEH of canines (e.g., SK-65), if any. The perikymata (surficial expression of the incremental growth striae of Retzius) are generally very prominent in *Paranthropus*, but they are probably only accentuated by the relatively thicker enamel, and have no pathological significance. I also observed frequent nontransverse pitting and crenulations in *Paranthropus* teeth (mainly molars), as previously indicated by other authors [1], but their etiological basis is probably genetic (amelogenesis imperfecta). I suggest that the negligible prevalence of TEH in *Parathropus* indicates biological and behavioral differences with respect to the protohuman hominids, such as less altricial infants and an earlier maturation (e.g., a more gorilla-like pattern), which should be added to the growing list of contrasts between *Paranthropus* and *Australopithecus* s.l./*Homo*.

I am grateful to (alphabetically) E. Bombin, C. K. Brain, R. J. Clarke, A. R. Hughes, K. Muehlenbachs, P. V. Tobias, and E. Vrba, for their generosity.

Received November 29, 1989 and January 2, 1990

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Naturwissenschaften 77, 129 – 130 (1990)

X-Ray Evidence for Structural Transformation in Ni_3Al Alloys at Higher Temperatures

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Ni_3Al is widely accepted as an ordered structure of the $L1_2$ type. Since superlattice reflections have been noticed at expected locations up to very high temperatures (of the order of 1300 °C), it is believed that this ordered structure exists as such to very high temperatures, even close to the melting point [1].

This structure has evoked great interest due to the anomalous positive temperature dependence of strength [2]. Most experiments done by different researchers have involved prior heat treatment at 850 °C or higher for long periods of the order of 1 or 2 days [3]. Some discrepancies, however, have been noticed in the lattice constants of alloys in the Ni_3Al homogeneity region which have not been satisfactorily explained or accounted for [4]. Widely different values of the order parameter have also been reported for these alloys. In one case even an abnormally high value of the stacking fault parameter has been reported on filings of materials quenched from 1350 °C and also an unusual variation in lattice constant values between the filed and annealed (900 °C) materials [5].

To clarify some of these anomalies, a systematic X-ray diffractometric study was undertaken on the following four alloys in this investigation: 75 Ni – 25 Al; 75 Ni – 25 Al – 0.1 B; 76 Ni – 24 Al; 76 Ni – 24 Al – 0.1 B (the compositions are expressed in terms of atomic percent for nickel and aluminium, while it is expressed in weight percent for boron).

Filings were produced from blocks of these alloys. Such blocks were slowly cooled to room temperature after holding at 1000 °C for 48 h. Diffractograms were obtained from the filings after annealing at progressively higher temperatures from 200 up to 1200 °C, in each case the holding time was 2 h. In a few cases, the influence of a longer holding time (up to 24 h) was also in-

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vestigated. Order parameters were estimated using the (100)/(200) and (110)/(220) pairs.

On the basis of this investigation it appears that:

1) The $L1_2$ structure attains a maximum stability at about 600 °C where the order parameter is near the theoretical value.

2) As the temperatures exceed 600 °C, the order parameter goes down.

3) Another (possibly ordered) structure seems to form around 800 °C as revealed by a faint split of the (220) reflections. At an intermediate temperature, viz. 700 °C, a broadening is noted in the profiles without any splitting. This may be due to the transition from $L1_2$ structure to the other structure. As the temperature is raised further to 1000 °C and with a long holding time (24 h) at this temperature, there is a clear split of the (200) line as well as a marked distortion in the (111) profile. A splitting is also observed in the (110) superlattice line. The order parameters calculated on the basis of an $L1_2$ lattice go clearly beyond the maximum theoretical value of unity. With further heating to 1200 °C, the splitting of the (200) as well as the distortion of the (111) become more marked. The superlattice lines (100) and (110) also appear to split.

The lattice constants appear to increase from 600 to 1000 °C when held for 2 h. With longer holding times at 1000 and 1200 °C, the crystal structure could not be satisfactorily indexed on the basis of an $L1_2$ structure. At these temperatures the structure appears to be of a lower symmetry. The existence of these two different structures was confirmed by an experiment in which the samples were cycled between 600 and 1000 °C and held for long periods. The anomalies seen in the line profiles and the lattice constants were clearly reproducible confirming that the $L1_2$ structure in Ni_3Al alloys is not as uniquely stable at higher temperatures as is widely believed to be the case. In view of these observations, which suggests that the structure of Ni_3Al alloys above 600 °C is not of the $L1_2$ type, the results of earlier works on lattice and order parameter determinations at high temperatures, in which an $L1_2$ structure is assumed, may have to be revised.

It is possible that the anomalous strengthening with increasing temperatures in Ni_3Al alloys seen by many authors could be related to this structural change.

Received December 18, 1989

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Naturwissenschaften 77, 130 – 133 (1990)

Interactions Between e-Vector Orientation and Weak, Steady Magnetic Fields in the Honeybee, *Apis mellifica*

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The ability of honeybees to orient themselves by using the pattern of skylight polarization was first shown by K. von Frisch (for review see [1, 2]). If bees are dancing on a horizontal comb and can see sufficiently large blue patches of the sky, their waggle dance direction will point towards a given food source. The reference system used is the distribution of e-vector directions over the celestial hemisphere that depends on the position of the sun. The observation that the influence of optical stimuli on the dancing behavior of bees is affected by magnetic fields [3] led us to consider whether there are interactions between polarized light perception and magnetic fields (MF). The results indicate that the Earth's magnetic field (EMF) is used as a reference system for e-vector orientation.

Groups of 20 – 25 individually labeled bees were trained to visit an artificial food source containing 2 *M* sugar water 500 m away from the hive. The feeder was positioned at 153° E of magnetic north. The two-framed observation hive was laid horizontally with the flight hole pointing south. The top of the hive was equipped with UV-transmitting quartz glass. For periods of 15 min each of the foragers were exposed to a circular patch of blue sky in the zenith with a diameter of 40° or 20°, and their dance directions were recorded. After the observation period the hive was covered with a wooden lid for 15 min to provide dark conditions. Simultaneously, the hive was inclined to 15°, a dip that is sufficient for normal, gravity-oriented waggle dances [4]. This period in the dark was follwed by another 15 min of observation, etc. The direction indication of the bees was checked using a protractor mounted above the dancing floor. Single waggling runs were protocolled for their orientation either towards the food source or in the opposite direction (i.e., 153° and 333°, respectively). The mean percentage of unimodal dances, i.e., those pointing towards the food source, was evaluated for consecutive time periods of 15 min. The hive was