containing fraction: 1. confluent cultivated fibroblasts on glass coverslips were fixed for 30 sec with ethanol, rinsed 3 times in PBS and then incubated with the factor containing fraction (50 µl, 500 µg/ml per coverslip). The incubation drop was recovered 15 min later, boiled for 3 min in sample buffer and applied on a 10% SDS polyacrylamide gel[15]. As a control, the same incubation was made with PBS. A new band comigrating with actin was clearly visible only on the gel of the sample incubated with the factor (figure 3,b). 2. The factor containing fraction (200 µl) was incubated first with trypsin (2 µl, 5 mg/ml in PBS, Worthington Biochemical Corp., Freehold, N.J., USA) for 1 h at room temperature, then trypsin inhibitor was added (Soyabean trypsin inhibitor, 2 µl, 10 mg/ml distilled water, Worthington Biochemical Corp.; coverslips of cultivated fibroblasts were treated with the trypsinized fraction followed by staining with AAA. The trypsinized fraction did not abolish AAA staining. 3. The factor-containing fraction was incubated overnight with F-actin from rabbit skeletal muscle, then boiled for 3 min in sample buffer and applied on a 10% SDS polyacrylamide gel. No changes in the position of the actin band were seen on the gel when compared to F-actin non-incubated with the factor. 4. We tested DNAse activity (by checking on agarose gel electrophoresis the nicking of supercoiled r-DNA plasmid[16]) and thrombin activity[17,18] of the fraction containing the factor; in both cases the tests were negative.

These results show that human plasma and serum (as well as the other plasma or sera tested) contain a factor which destabilizes F-actin. Since it does not alter the migration of actin on a SDS polyacrylamide gel, it is probable that the factor depolymerizes actin. The possibility of an actin-depolymerizing activity of plasma was briefly raised recently[19]. Further studies are on the way in order better to characterize the nature of this actin-destabilizing factor and to study its possible function.

1 Acknowledgment. This work was supported by the Swiss National Science Foundation, grant No.3.692-0.76. We thank Drs M. Crippa and C.A. Bouvier for measuring the DNAse and thrombin activities. The technical help of Mrs M. Redard and A. De Almeida and the photographic work of Mr J.-C. Rumbeli and Mr E. Denkinger are gratefully acknowledged.

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Influence of the earth's magnetic field on the comb building orientation of hornets

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Summary. Introduction of a magnetic field that counteracts the vertical component of the earth's field, thereby creating a total 'zero field' is lethal to juvenile hornets and completely disrupts the comb-building orientation of adult hornets. This suggests that the terrestrial magnetic field is the main guideline for vespan building orientation.

It has been shown by Martin and Lindauer[1] that the earth's magnetic field affects the orientation of insects. The influence of additional magnetic fields on the building orientation and behavoir of hornets *(Vespa orientalis)* has been reported by the present authors[2,3]. Ishay and Sadeh[4] noted that adult hornets placed in a centrifuge built their combs in the normal vertical direction, although the resultant of the gravitational and centrifugal forces was directed at 45° from the vertical; juvenile hornets placed in the same centrifuge built their combs in the direction of the resultant force. These findings suggested that adult hornets develop an orientation mechanism that helps them build in the right way even under changed gravitational fields. The influence of the horizontal component of the terrestrial magnetic field on randomly moving hornets is averaged to zero, which indicates that vespan building orientation is influenced only by the vertical component of the terrestrial magnetic field.

The aim of the present study was to investigate the influence of the earth's magnetic field on the comb-building orientation of hornets, which in nature as well as in artificial breeding boxes (ABBs) is almost invariably in the vertical direction[2].

Materials and methods. Hornet workers *(V. orientalis)* maintained in ABBs in groups of 10–20 individuals were placed both inside a previously described solenoid[2,3] as well as at some distance from it in the same room (control). Experiments were conducted with adult worker hornets more than 1-day-old and juvenile hornets of lesser age. The hornets were provided with the usual food and building material[2]. The solenoid was placed vertically on 2 timber slabs to allow air circulation through its interior which housed four ABBs during each experiment. The maximum current in the solenoid's coil was 37.2 mA (inverted natural field). The heat power dissipated did not exceed 0.04 W and no

Effects of additional magnetic fields on hornet behavior and building orientation

Observed phenomena	Vertical component of the total magnetic field (horizontal component natural)					
	Natural (control)	Zero field		Inverted natural field	Pulsed fields averaged to zero	Pulsed fields averaged to half the natural
	Adults and juveniles	Adults	Juveniles	Adults and juveniles	Adults and juveniles	Adults and juveniles
Building activity	10-20 workers build a comb in 5-7 days	Small groups of cells on walls	Almost none	As in control after 2-4 days delay	None	As in control
Pedicle orientation	From the ceiling downwards	Mostly without pedicles	No pedicles	From the ceiling downwards	-	As in control
Cell axis orientation	Downwards scatter 6-12°	Random scatter 10-50°	-	As in control	-	As in control
Number of cells	10-30	1-5	Seldom	5-11	-	2-11
Type of cells	Worker cells	As in control	-	As in control	-	Twice larger than normal by volume
Oviposition	1 egg in every cell	None	-	About 50% of the cells	-	1 egg in every cell
Mortality	0-5%	25%	70-90%	15-20%	10-15%	20-65%

detectable temperature change could be generated by it. Experiments were performed in the following four directions:

1. Zero field. The vertical component of the terrestrial magnetic field is counteracted by the axial field of the solenoid with an accuracy of 1-5% in the middle part of the solenoid[2,3]. Such a field may simulate natural conditions existing near the magnetic equator (e.g. Indonesia, or Equatorial Africa). I = 18.6 mA.
2. Inverted natural field. The vertical component of the resultant magnetic field is the same as the natural (in Tel-Aviv) but its direction is reversed. This is in simulation of the natural magnetic field in some parts of the Southern hemisphere, I = 37.2 mA.
3. Pulsed fields averaged to zero field. The vertical component of the resultant magnetic field is natural (0.5 sec) and inverted (0.5 sec). The time average field is zero.
4. Pulsed fields averaged to half the natural field. The vertical component of the resultant field is natural (0.5 sec) and zero (0.5 sec). The pulses in 3 and 4 were almost square since the time constant of the coil did not exceed 8 msec.

Results. The significant results of the various experiments are summarized in the table. Absence of the vertical component of the terrestrial magnetic fields resulted in a complete disorientation of both adult and juvenile hornets. Adult hornets, however, built cells or even small combs (mostly on the walls) in which they deposited eggs, whereas juvenile hornets mostly died without performing any worthwhile building. This suggests that for juvenile hornets, the earth's magnetic field is essential not only for proper orientation but also for vital biological functions. Juvenile hornets placed in pulsed fields averaged to zero did not build (and neither did the adult hornets) but their nortality rate was only 10-50%. Apparently pulsed fields even with a zero time average value are not lethal to juvenile hornets as are the zero fields (total absence of the vertical field). Hornets placed inside an inverted magnetic field needed some time (2-3 days) to adapt but then proceeded to develop and build in a normal manner. Hornets placed in pulsed fields averaged to half the natural field built regular combs albeit with cells almost twice the natural size, but displayed a relatively high mortality rate. In zero field conditions only 2 combs were observed: 1 attached to the ceiling, with 2 uncompleted cells, and 1 attached to a wall, with 2 cells oriented at 40-50 °C from the vertical. Both pedicles had an elliptical cross-section with the larger axis oriented in the North-South direction, while normal pedicles have a circular cross-section.

In the 2 AABs placed at both ends of the solenoid, where the axial field of the solenoid is not uniform, some additional phenomena were observed: a) simultaneous building of combs on the ceiling and on the side-walls; b) combs with cells of different sizes, namely, 2-3 of normal size and 2-3 of much larger size; and c) the cell walls contained considerably more strips of cellulose than did cell walls in the control boxes.

Discussion. The findings of the present study suggest that the vertical component of the earth's magnetic field strongly affects building orientation and other life processes of hornets, especially of juvenile members not older than 1 day. Total absence of the vertical magnetic field during several days is lethal for juvenile hornets and depressant for adult worker hornets. Absence of the vertical component of the magnetic field completely disorients hornet building, thus indicating that gravitational force alone is not what determines hornet building in the vertical direction; whereas they are able to build vertically in the centrifuge under the influence of the natural magnatic field[4]. At the same time it is known that in equatorial regions, hornets direct their building vertically without the aid of the vertical magnetic field which, in these regions is almost zero. Building orientation by species nesting in these areas is determined probably only by gravitation.

The direction of the vertical magnetic fields is, as expected, of no great importance to hornet workers, because when placed in an inverse field they need only 2-4 days to adapt and then proceed to behave in an almost normal manner.

Pulsed magnetic fields with amplitudes not exceeding the terrestrial field and with pulse duration of 0.5 sec affect hornets building almost in the same way as do the time-averaged fields created by the pulses. It is worth observing that additional magnetic fields are lethal for adult hornets but not even depressant for juvenile hornets[2], whereas the absence of the vertical component of the earth's magnetic field (leaving the horizontal component unchanged) is lethal for juvenile hornets.

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