'Possible' and 'probable' alien planets

The possibility of planets orbiting stars other than the sun interests a lot of astronomers — if one may judge from the number of them who listened to a press conference on the evidence for low-mass companions to nearby stars at last week's meeting of the American Astronomical Society and the Canadian Astronomical Society in Vancouver, British Columbia. Bruce Campbell of the Dominion Astrophysical Observatory in Victoria, British Columbia, and Gordon Walker and Stephenson Yang of the University of British Columbia in Vancouver reported that a six-year survey of the motions of 15 stars yielded evidence of seven "possible" or "probable" companions with masses 1 to 10 times that of Jupiter. They did their work with the 3.6-meter Canada-France-Hawaii telescope on Mauna Kea on the island of Hawaii.

Previous results have claimed evidence for dark companions that are generally much larger, particularly brown dwarfs, objects with masses between one-tenth and one-hundredth of the sun's mass (SN: 11/1/86, p.282). (Ten Jupiter masses equal one-hundredth of the sun's mass.) However, some of these claims have disappeared under further scrutiny, and unsuccessful searches for brown dwarfs have convinced a number of astronomers that, as Campbell says, "brown dwarfs may not exist at all." If so, the evidence for slight cyclic variations in the motions of the seven sun-like stars could point to planet-sized companions. Recognizing both the indirect nature of the evidence and the difficulties encountered by other such claims, Campbell declares: "Our results need to be confirmed."

Campbell, Walker and Yang find evidence for such small companions by using a newly developed technique that is 50 to 100 times as sensitive as conventional methods. It can detect changes in stars' motions as small as 40 kilometers per hour. If a star has companions — of any size — the star and companions will orbit their common center of mass. If the companions are invisible, the star's orbital motion will betray their presence: Astronomers will see the orbital motion as a cyclic back-and-forth, either in the line of sight (radial motion) or across the sky (proper motion).

Campbell and his co-workers are studying radial motion. Their technique is to take spectra of the star over a period of years. In the starlight are emission lines — resonant frequencies of particular chemical elements. The wavelengths of these lines shift slightly as the star moves, to the red as it recedes from us and to the blue as it approaches. To detect the shifts, the astronomers compare the star's spectrum with that of a standard lamp.

In the conventional technique, observers first make a spectrum of the star, then turn the spectrograph on to the lamp and print its spectrum next to the star's. The switching back and forth introduces a lot of systematic errors that reduce the accuracy. Instead, Campbell, Walker and Yang pass the star's light through a tank of hydrogen fluoride, which happens to have the wanted emissions lines, on the way to the spectrograph. This imposes the reference spectrum on the star's spectrum in one act, reducing the errors considerably, the observers say.

The 15 stars surveyed were chosen because they are similar to the sun in major characteristics, particularly mass, and do not have known stellar companions. However, this work found that one of them, Gamma Cephei, is in fact a binary star system and also has a third, much smaller object in the system. In this case the small object imposes a motion on the star that has a period about 2.7 years. Having followed that motion for more than a full period, the observers call this instance one of their "probables." The other probable is Epsilon Eridani. (Both stars are within 50 light-years of earth.) Five more are possibles, whose motions have not been followed long enough for astronomers to be certain they are cyclic.

The work needs extension and confirmation, and this and other groups are at work on it. — *D.E. Thomsen*

Getting the drop on blood pressure

Several recent studies have suggested that muscle-relaxation training and biofeedback techniques that promote relaxation reduce the blood pressures of some hypertensives. But scientists at SRI International, a nonprofit research organization in Menlo Park, Calif., now report that there is a simpler alternative for newly diagnosed mild hypertensives: no relaxation training, no medication, just regular blood pressure monitoring for at least one year.

"We were surprised by the results," says project director Margaret A. Chesney. "It appears that before physicians make decisions about medications or other treatments for mild hypertensives, the first step might be systematic blood pressure monitoring."

The researchers recruited unmedicated persons with mild hypertension, whose diastolic blood pressure (when the heart expands) ranged from 90 to 104 mm Hg, from two large companies near San Francisco. They randomly assigned 40 mild hypertensives to blood pressure monitoring every nine weeks at both a company medical clinic and each participant's worksite. Another 118 hypertensives received 13 weekly instruction sessions in a behavioral treatment, either muscle-relaxation procedures alone or in combination with biofeedback measures of muscle relaxation, "cognitive restructuring" aimed at identifying stressful situations and thoughts, and advice on exercise and dietary changes.

In company clinics, significant blood pressure reductions for both behavioral treatment and monitoring groups appeared after 18 weeks, report Chesney and her co-workers in the May/June PSYCHOSOMATIC MEDICINE. Systolic blood pressure (when the heart contracts) fell an average of 7.4 mm Hg for those receiving behavioral treatment and 9.0 mm Hg for subjects being monitored. Diastolic blood pressure declined an average of 4.5 mm Hg for the former group and 5.9 mm Hg for the latter group. These reductions remained 36 weeks later.

Both groups also displayed significant blood pressure reductions at the worksite by the end of the year-long study.

Reasons for the equal effectiveness of behavioral treatments and blood pressure monitoring are unclear, says Chesney. The percentage of individuals whose personal physicians prescribed antihypertensive medication during treatment did not differ between the two conditions, and neither group showed significant changes in weight. These factors, notes Chesney, are unlikely to have accounted for the results.

But there are several possible explanations. "When blood pressure is repeatedly measured," she says, "there may be a desensitization to anxiety that often elevates the blood pressures of mild hypertensives in clinic settings." Expectations that blood pressure will drop as a result of monitoring may also be critical. Furthermore, monitoring may serve as a form of biofeedback, since participants see their blood pressure readings at each measurement session.

"We need to study more closely what repeated blood pressure measurements do to the sense of control over one's body," says Chesney.

Relaxation training has useful short-term effects, however, on hypertensives whose blood pressures are not controlled by medications, report W. Stewart Agras of Stanford University School of Medicine and his colleagues in the same PSYCHOSOMATIC MEDICINE. They identified 137 such individuals in the sample screened by the SRI scientists and assigned them either to relaxation training or blood pressure monitoring. The proportion of those whose blood pressure came under control was markedly greater in the relaxation group up to a two-year follow-up. At a 30-month follow-up, there was no significant difference between the groups. — *B. Bower*