BIOLOGY

Birds of a feather: Together or apart

The social organizations of animal species may be connected by revolving doors, rather than locked barriers of genetic predisposition. The acorn woodpecker is known for its unusual group life — birds defend a year-round territory, harvest and store nuts collectively, breed communally and all feed the nestlings. However, in the Dec. 22 SCIENCE, University of Colorado researchers report that in southeastern Arizona acorn woodpeckers can exhibit a significantly different behavior pattern and that the birds can shift between the two strategies depending on the abundance of food.

The majority of acorn woodpeckers at the Research Ranch in Elgin, Ariz., do not store acorns in trees. Instead they place nuts in natural crevices, but usually exhaust those stores rapidly in autumn and then abandon the area. These migratory woodpeckers do not breed in communal groups, but in temporary pairs.

Peter B. Stacey and Carl E. Bock report that the two forms of storage behavior and social organization occur in woodpeckers occupying adjacent territory. In addition, some birds migrate in years of short acorn supply, but not in others. The plasticity of the woodpeckers' behavior may be an adaptation to the marginal characteristics of that habitat, the researchers suggest. It is an area suitable for reproduction, but the birds retain the option of moving elsewhere when the food is scarce.

Plant reads animal message

The machinery for translating genetic information coded in nucleic acids into the protein components of a cell appears to be interchangeable among a wide range of organisms. Researchers at the Max Planck Institute for Cell Biology in West Germany report that the cytoplasm of the unicellular giant alga Acetabularia can produce specific proteins directed by RNA from the animal Mengo virus. The technique, described in the November PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, involves injecting the animal virus RNA into isolated algal nuclei and then implanting each nucleus into anucleated cytoplasm. This procedure should allow researchers to modify either nuclei or cytoplasm to study processing of genetic information and its regulation within the nucleus or during transfer across the nuclear membrane.

Seed clutches for any climate

Animals in the tropics tend to have smaller litters or clutch sizes than animals in more temperate regions, according to evolutionary rationale. In the reliably warm climates, the argument goes, the premium is on sinking energy into care of a few young, while in areas of less predictable weather it seems wiser to invest in a larger number of offspring. Much data on bird and mammal tropical and temperate species support this hypothesis. But the rationale should also apply to plants. In the Dec. 14 NATURE, Robert M. May of Princeton University discusses the first examination of plant clutch size as a function of latitude. Despite problems in defining what makes up a clutch or litter of a plant, Donald Levin and Billy Turner of the University of Texas at Austin recently reported evidence extending to the animal kingdom the relationship between reproductive strategy and geography. Among *Compositae,* plants like dandelion and thistle with clumps of flowering heads, the number of ovules per head increases with latitude. In addition, the summed weight of the seeds in a flowering head averages 300 milligrams for tropical species and 400 milligrams for temperate ones. Therefore, the amount of energy invested per head in seed production also corresponds to the climate.

PHYSICAL SCIENCES

PETRA problems

When the physicists who build particle accelerators want to build a more energetic version of something they have, they have often proceeded as if the important factors, both the advantages and the detriments, would scale up in a relatively simple additive way. This seems to be particularly true with the electron-positron storage rings and colliding beam facilities, whose success at doing things that critics thought would be impossible, or at least much more difficult, has generated a certain optimistic momentum about upscaling. Current construction is upscaling the energy of the first generation of such rings by a factor of two or three, and there are plans for factor-of-ten increases in the not too distant future.

It may not go quite so linearly as everyone hoped. The first of the factor-of-two upscalings, the PETRA facility at Hamburg, is undergoing test runs now, and, according to a report in the Dec. 14 NATURE, certain unexpected problems that have physicists a little worried are beginning to show up.

One important factor involves the transverse forces that occur between the accelerated bunches of particles. These forces limit the number of electron-positron collisions that can take place in a given time. All existing machines of this type had the same limit, and it had been assumed that it would stay the same at higher energies. PETRA's is coming out much less. If the lessening of collision rate with higher energy turns out to be a general rule, that could mean serious trouble for very high energy (100 billion electron-volt) installations. Other difficulties include instabilities in managing the beams because the beams induce currents in the vaccuum chamber walls that react back on the beam and because the bunches are coming out bigger than expected. European physicists are holding meetings about PETRA's difficulties and what they may mean for future ultrahigh energy projects.

Radio formaldehyde calling

There are any number of radio frequencies on which a station might broadcast, and in fact quite a wide spectrum is assigned to broadcasters on earth, but if a civilization were seeking to contact civilizations belonging to other stars, what channel would they use?

Guessing the frequency another civilization might employ is an interesting exercise in applied psychology. Years ago Philip Morrison and G. Cocconi proposed the characteristic wavelength at which atomic hydrogen emanates, 21 centimeters. That was then the only known radio spectral line in astronomy, and Morrison and Cocconi based their argument on its uniqueness. Everyone in the universe would know it and be studying it.

Today radio spectral lines of nearly 50 different chemical species in the universe are known. Is it worthwhile to assume that any one of them makes an obvious beacon carrier? Yes, say three astronomers from the University of Tokyo's Tokyo Astronomical Observatory, M. Morimoto, H. Hirabayashi and J. Jugaku in the Dec. 14 NATURE. It is the 4,829.659 megahertz line of formaldehyde.

Their reasoning is based on the so-called antimaser effect, by which, if the emitter is located in front of a dark cloud, absorption lowers rather than raises the background temperature. The background temperature will even be below that of the universal three-degree blackbody, and so this line under those conditions is exceptionally noise free. Morimoto, Hirabayashi and Jugaku reason that a civilization knowing they are in front of a dark cloud with respect to us might broadcast on that frequency, and consequently we should search at that frequency. They give a list of 36 likely stars in the direction of the Coal Sack Nebula for a start.