

Quasars Remain Puzzling

➤ ANOTHER mystery has been wrapped around what are already the most puzzling objects yet detected in the sky, the peculiar sources of radio waves known as quasars.

Many astronomers believe quasars are the most distant objects observed in the universe.

Other astronomers have concluded that at least some of the quasars are actually relatively close, astronomically speaking, and are associated with peculiar radio galaxies.

Scientists determine distances to stars by measuring the changes in the positions of spectrum lines in the star's light, a yardstick indicating the speed at which the star and earth are receding from or approaching each other. If this Doppler shift is toward the red, the source is receding; if toward the blue end, it is approaching.

Astronomers have been searching, so far unsuccessfully, for blue-shifted quasars. Three California scientists have now concluded that if the large red shifts observed for quasars are actually due to the Doppler effect, then

many more quasars with blue shifts than with red shifts should be visible.

They also conclude that if the red shifts are a Doppler effect, quasars have not been ejected from peculiar radio galaxies. If, on the other hand, quasars are associated with the peculiar galaxies, then the observed red shifts result from some other factor.

Their conclusions, reported in *Nature*, 211:502, 1966, are based on a mathematical analysis that rests on several assumptions. The assumptions include that the explosion centers ejecting quasars are distributed randomly in space, that the objects so ejected are hurled equally in all possible directions and that the geometry of the space involved is Euclidean.

Dr. John Faulkner of California Institute of Technology, Dr. James E. Gunn of Caltech's Jet Propulsion Laboratory and graduate student Bruce A. Peterson of Mt. Wilson and Palomar Observatories, all in Pasadena, made the calculations.

However, Dr. Harold S. Zapsky of the department of physics and astronomy at the University of Maryland, has come to exactly the opposite conclusion—there should be fewer blue-shifted than red-shifted quasars. This is based on the theory that quasars are local objects moving with velocities close to the speed of light, which is 186,000 miles a second.

Dr. Zapsky reported that his calculations based on the assumption that quasars originated from an explosion in or near the Milky Way are in good agreement with the observed red shifts of these objects. Details on his computations are reported in *Science*, 153:635, 1966.

Nature Note

Fritillaries

➤ THE TAWNY colored fritillaries are the largest family of true butterflies, and include some of the commonest and most beautiful insects.

They are members of the brush footed butterflies—so called because they have short front legs often covered with bristly scales like a brush.

True northern or Greater Fritillaries are medium to large in size and have different shades of orange and yellow, marked with jet black. On the underside of the wings, especially on their hind wings, are uneven rows of silvery spots.

The large fritillaries are strong and fast fliers—but they frequently stop to feed on flowers.

The grandest fritillary is the Diana, a shy butterfly that keeps to the woods and thickets and is hard to catch. The female has beautiful wings that are black at the base and blue and blue-green in the center and near the edge. This cautious butterfly seldom is attracted to flowers, but prefers manure.

The Great Spangled Fritillary is one of the most familiar in the eastern United States. It is found in wet meadows and open woods from eastern Canada to Michigan and Oklahoma and in the mountains south to Georgia.

The males break out from their cocoons in May, the females about June, and they both are active until the middle of August, when they begin to disappear. By September they are scarce. They have laid their eggs for the next generation. These eggs turn into the second stage of butterfly metamorphosis—the velvety dark brown or black larvae which hibernate during the winter months without eating. In spring each baby larva munches on fresh violets until it turns into an inactive pupa, and finally emerges as a winged butterfly.

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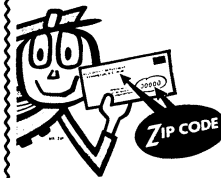
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