# ASTRONOMY

*Kendrick Frazier reports from Albuquerque, N.M., at the International Astronomical Union Symposium on Extragalactic Radio Sources*

## Radio galaxies: Oort's twenty questions

The Dutch astronomer Jan H. Oort, now 81, is the grand old man of astronomy and one of the world's leading authorities on galaxies. In giving the introductory talk to the assembled radio astronomers, Oort chose to emphasize what we don't yet know about radio galaxies as much as what we do. He issued a list of "principal problems with radio galaxies." It was soon affectionately being referred to by symposium participants as "Professor Oort's twenty questions." Later papers addressed many of them.

Why, for example, Oort asked, do strong radio sources always originate in elliptical galaxies and never in spirals? The answer is not clear. What is the total energy of strong radio sources and what powers them? Opinions differ about the energies, but Oort feels they may be even larger than previously estimated, up to $10^{63}$ ergs. As for the power source, most people, Franco Pacini of the University of Firenze points out, look to supermassive objects, most plausibly black holes (although less dense "spinars" can't easily be ruled out). In any event, the mass involved is on the order of 100 million times the mass of the sun.

One question occupying many astronomers is why do we frequently see one-sided jets emerging from radio sources, especially when so many radio galaxies show striking symmetry? Oort also has questions about normal galaxies. Have they all gone through a quasar stage? Quite possibly, he believes. And finally, do most, or all, major galaxies have central black holes? Attempts to obtain direct evidence have fallen short, but he has great hopes the Space Telescope can change that.

## Inner anatomy of Centaurus A

The earliest discovered radio galaxy is also (not coincidentally) the nearest: Centaurus A. Only 10 million light-years away, it sprawls across an angular area of our southern sky equal in width to 20 full moons, although the part visible in optical telescopes is much smaller than that. Its proximity allows radio astronomers to see things in it that they cannot hope to detect in more distant objects. Now several teams of scientists using the 27-dish Very Large Array radio telescope in New Mexico, as well as X-ray observations from the Einstein orbiting observatory, report new results (some of the data were obtained just the previous week) that show by far the most detail yet seen in Centaurus A.

Centaurus A has the classic shape of a radio galaxy, two symmetrical lobes connected by a "bridge." The most important new discovery is that this bridge connecting the nucleus and the lobes is not smooth, but has considerable structure within it. As summarized by Eric D. Feigelson of the Massachusetts Institute of Technology, "a whole string of knots"—about seven of them—of intensified radio brightness have been detected within the bridge. One, Knot A, contains four sub-knots, and there's even a kink in the structure. Each knot is about 200 parsecs in diameter and is emitting $10^{29}$ ergs of energy a second. "That's a lot," notes Feigelson. "Our entire galaxy emits that much."

## One-sided jets

Long, thin jets of material are fairly commonly detected within radio galaxies. Yet several bright sources such as quasar 3C 273 are famous for having high-speed jets protruding out one side. R. G Conway of Jodrell Bank in England asked whether such apparently one-sided sources really are one-sided. His answer is yes, they are. He found a complete absence of any faint counter jet on the other side of the quasar. But it may not be that simple. Philip Morrison of MIT raises an intriguing problem: Maybe it is too early. Perhaps the counter jet exists, but its light has just not reached us yet.

# CHEMISTRY

## THC libido: A little dab will do you

Marijuana smokers long have been at odds with researchers over the issue of that drug's effect on sexual activity. From smokers come anecdotal reports of marijuana's aphrodisiac high. From laboratory animal studies comes evidence that it suppresses male sexual activity. Now comes a potential explanation for the contradictory claims.

Susan Dalterio and colleagues of the University of Texas Health Science Center in San Antonio observed the effects of a wide range of doses of marijuana's active ingredient, delta-9-tetrahydrocannabinol (THC), on testosterone levels in the blood of male mice. Their results—published in the July 31 SCIENCE—indicate that both high and low doses of THC cause an initial increased concentration of plasma testosterone and luteinizing hormone. (Such increases lead to copulatory behavior in rats and mice.) In cases of high THC doses, however, that initial increased amount of the two hormones is followed by a considerable drop in their concentrations. Thus, anecdotal reports of the aphrodisiac effects of marijuana and evidence for its suppression of testicular activity may represent the effects of different doses.

## Too many electrolytes spoil the drink

After the team has sweated out a victory, what should it gulp down in order to replace fluids lost during the competition? Numerous marketed beverages (and now, even a chewing gum) claim to replace not only such fluids, but also specific electrolytes — usually sodium and potassium. Unfortunately, reports Patricia Beckwith of Children's Hospital in Los Angeles in SPORTSMEDICINE DIGEST (Vol. 3, No. 5), as marketed, these athletic drinks are hypertonic—that is, compared with the concentration of solutes in the blood, they contain too many electrolytes. When ingested, these hypertonic beverages draw body fluids into the stomach to dilute them. As a result, there is a lag between the time an athlete drinks the beverages and the time the athlete's body can absorb them.

To prevent this hydration delay, Beckwith recommends diluting the commercial drinks in accordance with the American College of Sports Medicine standards for concentrations of carbohydrate, sodium and potassium in beverages (see chart). According to these standards, "Pedialyte," a solution for infants, is the only commercial product acceptable in its undiluted state, she says, and it already is used by some professional and college teams. Finally, says Beckwith, "...when a normal mixed diet is consumed prior to competition, electrolyte replacement is not necessary." In this case, "water is the best and most easily available fluid replacement beverage."

**COMPARISON OF FLUID REPLACEMENT DRINKS FOR ATHLETES**
compiled by Patricia Beckwith, R.D., M.PH.

| Maximum suggested concentration* | 5.9 gm. carbohydrate | | 55 mg. sodium | | 46 mg. potassium | | |
|---|---|---|---|---|---|---|---|
| Drink | Carbohydrate gm/8 oz. | Necessary Dilution | Sodium gm/8 oz. | Necessary Dilution | Potassium gm/8 oz. | Necessary Dilution | Calories |
| Energade | 30 | 5 | 106 | 2 | 31.5 | 0 | 120 |
| Gatorade | 12 | 2 | 115 | 2 | 23.1 | 0 | 48 |
| Quickick | 11 | 2 | 138 | 2¼ | 5.5 | 0 | 44 |
| Super Socco | 31 | 5 | 27 | 0 | 35 | 0 | 125 |
| Wagner Thirst | 19 | 3 | 168 | 3 | 200 | 4 | 76 |
| Apple Juice | 29.6 | 5 | tr | 0 | 248 | 5 | 120 |
| Grape Juice | 42 | 7 | 25 | 0 | 293 | 6 | 167 |
| Orange Juice | 28.9 | 5 | 2 | 0 | 503 | 11 | 122 |
| V-8 Juice | 10.6 | 2 | 738 | 13 | unk | — | 47 |
| Country Time Lemonade | 22 | 4 | 50 | 0 | 1 | 0 | 90 |
| Hawaiian Punch (average) | 30 | 5 | 25 | 0 | 37 | 0 | 120 |
| Coca-Cola | 24 | 4 | 20 | 0 | tr | 0 | 96 |
| Dr. Pepper | 24.8 | 4 | 18.4 | 0 | 1.6 | 0 | 99 |
| Seven-Up | 24 | 4 | 20.5 | 0 | tr | 0 | 96 |

*from American College of Sports Medicine Position Statement on Prevention of Heat Injuries During Distance Running