SCIENCE

9 October 1970

Vol. 170, No. 3954

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Talk about a surprise!

A 21,000 rpm Centrifuge from Beckman.

It's the Model J-21—built with all that *ultra*centrifuge know-how for long trouble-free service. Before we introduced a general-purpose laboratory centrifuge, we made sure it was better than the best available—and it is. Speeds to 21,000 rpm/forces to 50,000 *g*/faster acceleration and deceleration/closer control to the set temperature from 1°C to ambient/seven-year warranty on rotors/longer brush life/solid state circuitry/more efficient rotors.

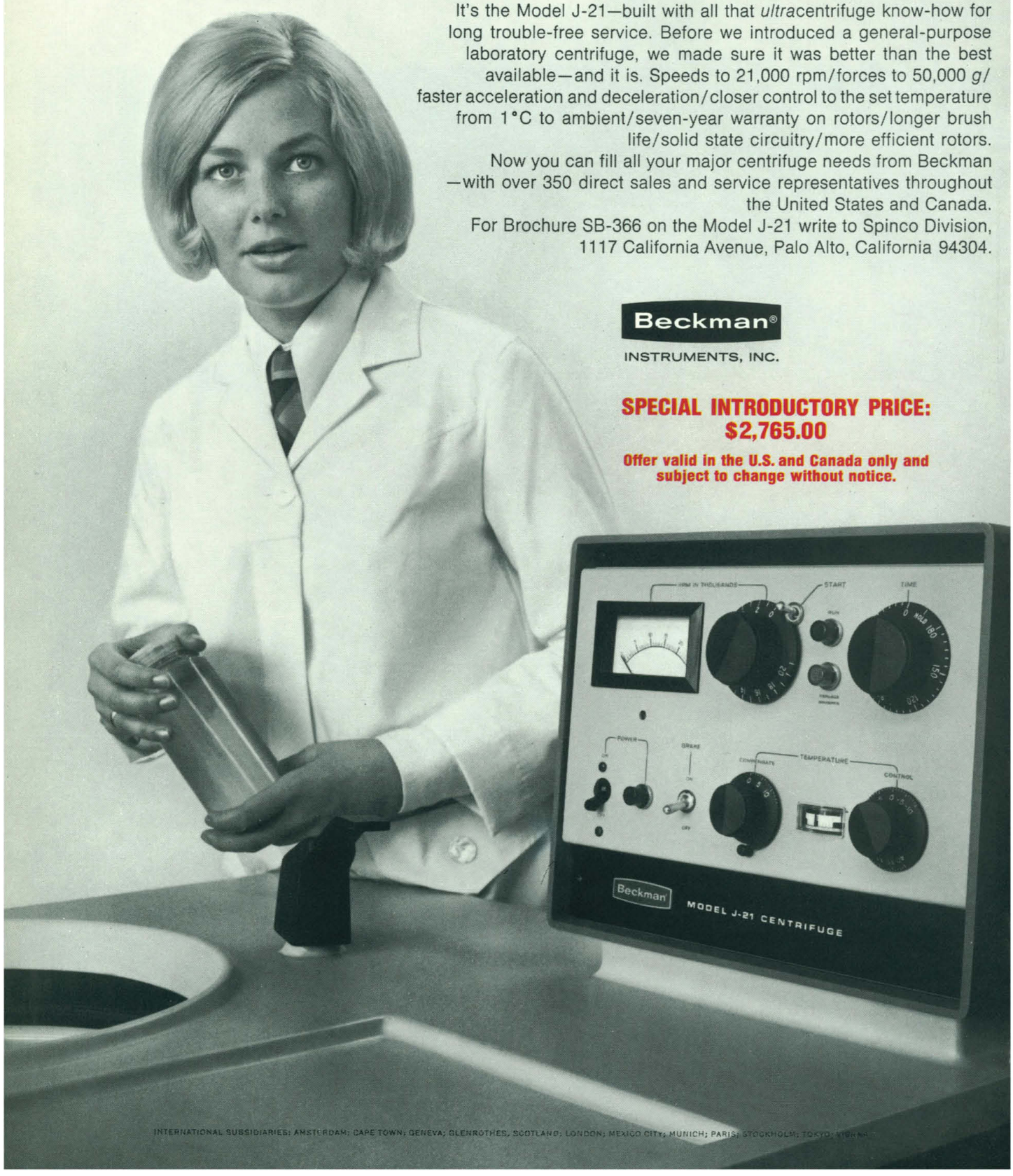
Now you can fill all your major centrifuge needs from Beckman —with over 350 direct sales and service representatives throughout the United States and Canada.

For Brochure SB-366 on the Model J-21 write to Spinco Division, 1117 California Avenue, Palo Alto, California 94304.

Beckman®
INSTRUMENTS, INC.

SPECIAL INTRODUCTORY PRICE: $2,765.00

Offer valid in the U.S. and Canada only and subject to change without notice.



9 October 1970
Vol. 170, No. 3954

SCIENCE

SCIENCE is published weekly on Friday and on the fourth Wednesday in September by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with **The Scientific Monthly®**. Second-class postage paid at Washington, D.C. Annual subscription $12; foreign postage: Americas $3; overseas $5; single copies, 50¢ (back issues, $1) except **Guide to Scientific Instruments** which is $3. School year subscription: 9 months, $9; 10 months, $10. Provide 4 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the **Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Cloud on 19 May 1968 that is growing explosively 13 minutes after having been seeded with silver iodide pyrotechnics. Height of the cloud top is 11.5 kilometers enroute to a maximum height of approximately 12.5 kilometers. Picture was taken from a DC-6 aircraft flying at 6.1 kilometers over southern Florida. See page 127. [Environmental Science Services Administration Research Laboratories, Coral Gables, Florida]

Federal Graduate Aid: Errors in Planning and Support

A recent letter by Demerath, Lehman, and Little (31 July) makes three points concerning the crucial problem of federal aid to graduate students:

"First, such a loan program might well produce a sharp decline in the number of individuals going into graduate study." My first reaction to this probably correct statement is, "What's wrong with that?" At least in my own area of physics, there is an oversupply of trained physicists. Why actively encourage individuals to enter the field and train them for the disappointment of not finding employment in the area of their expensive training?

The authors continue, "there is a distinct possibility that he [a prospective graduate student] will elect those fields where the anticipated payoff is much greater, thus producing a major change in the distribution of students to fields—and for the wrong reasons." Exactly what are the correct reasons for selecting a profession? In a free marketplace, supply and demand are supposed to fix the cost of goods and services. A highly paid profession is supposedly the result of a shortage of trained personnel in that profession. If one has an interest in a subject, what better reason exists for selecting it as a profession than the feeling that one is needed?

The second point takes note of the job squeeze on Ph.D.'s but states, "In anthropology, psychology, and sociology there is a well-documented need for increasing numbers." Does it occur to the authors that the current glut of scientists and the purported need in other areas might be related to the federal financial support of graduate students in science over the past few years? This is an excellent example of how artificial student support upsets the supply of trained people. Without this support, perhaps many physicists, who are now underemployed, would have gone into anthropology, psychology, and sociology. Who, among us who have attended graduate school in science, did not know at least one fellow graduate student who would really rather have studied music or languages or art, but chose science because he was capable and he could get financial support for study in science but not in art?

"Third, quite apart from graduate students, graduate schools would almost certainly suffer a major blow." Again, what is wrong with that? What axiom of nature states that most of the 50 states must maintain two or more graduate schools to train graduate students who are not needed in the society that supports the schools? Before continuing this type of support, I would like to see some solid evidence that these highly trained people are needed. It is no service to mankind to "give" a student several years training in a highly skilled profession when there is no opportunity to practice the profession at the successful completion of training.

This is not intended as a tirade against financial support of graduate study but rather against the level of that support and the strings which are attached to it. It is difficult for a small funding group to plan accurately 5 years in advance and even more difficult to get the machinery of government to respond to changing needs. It is now clear that federal support of graduate study in science has continued well past any shortage of scientists. Perhaps it would be better if that small group disseminated the best possible information on future needs in the hope that many small errors in planning made by individuals would cancel out statistically.

FRANK D. FEIOCK
3320 Stadium Court,
San Diego, California 92122

Is the Budget Bureau Objective?

Vic Reinemer's report ("Budget Bureau: Do advisory panels have an industry bias?" 3 July, p. 36) and Robert P. Mayo's response to it greatly interested me although I have no more involvement than that of any other citizen. Reinemer gave considerable details and specifics of the behavior of the advisory bodies so that it appears that Mayo's "unfair and misleading" charge needs more supporting evidence. Nor can I agree with Mayo that the events Reinemer refers to are "ancient history" since new practices, if any, were evidently introduced by the Bureau of the Budget only during the current year.

In view of the long history of regulatory agencies being largely staffed from, and being quasi-captives of, business interests, it is not enough for the budget bureau to merely open committee and panel hearings "to all interested parties, without exception." A responsible attitude would cause the Bureau of the Budget to exert considerable

initiative to see that all parties whose interests could be anticipated were advised of hearings. The town meeting variety of "participatory democracy" is not feasible at the federal level, of course, but the agency is in the best position to make certain that "representative democracy" operates in such a hearing. There is little to suggest that the Bureau of the Budget is interested in doing this.

I would agree with Mayo's view that it was beneath notice to suggest that a Bureau of the Budget official could be corrupted with a meal. But his men have not felt the same way. Two years ago in the NIH cafeteria I attempted to pick up a 90-cent check for a friend of 20 years. He asked me in horror not to because it was a severe violation of policies set out by the Bureau of the Budget.

E. G. STANLEY BAKER
Department of Zoology,
Drew University,
Madison, New Jersey 07940

Laboratory Yogurt

May I suggest a less classic but more controlled way of producing yogurt than that given by Segal (Letters, 31 July). The Traditional Tricky Turkish Towel Temperature-Time Technique is sporting, but some *Science* readers may prefer a more reproducible recipe.

To make about 2 quarts of high-protein yogurt for 20 cents, mix 1½ cups of powdered skim milk, 3 tablespoons of commercial yogurt, and a large can (13 ounces) of evaporated milk into 1½ quarts of lukewarm water (*1*). Incubate at about 43°C for 3 to 4 hours, or until thick; longer time gives a tangier product.

If your laboratory's constant-temperature baths are temporarily tied up with scientific experiments, fill a thermostatically controlled electric frying pan or similar kitchen gadget with water and check the temperature setting with a reasonably good thermometer. In a shallow water bath, small jars are convenient containers.

JEROME GOODMAN
35 Pond Road,
Great Neck, New York 11024

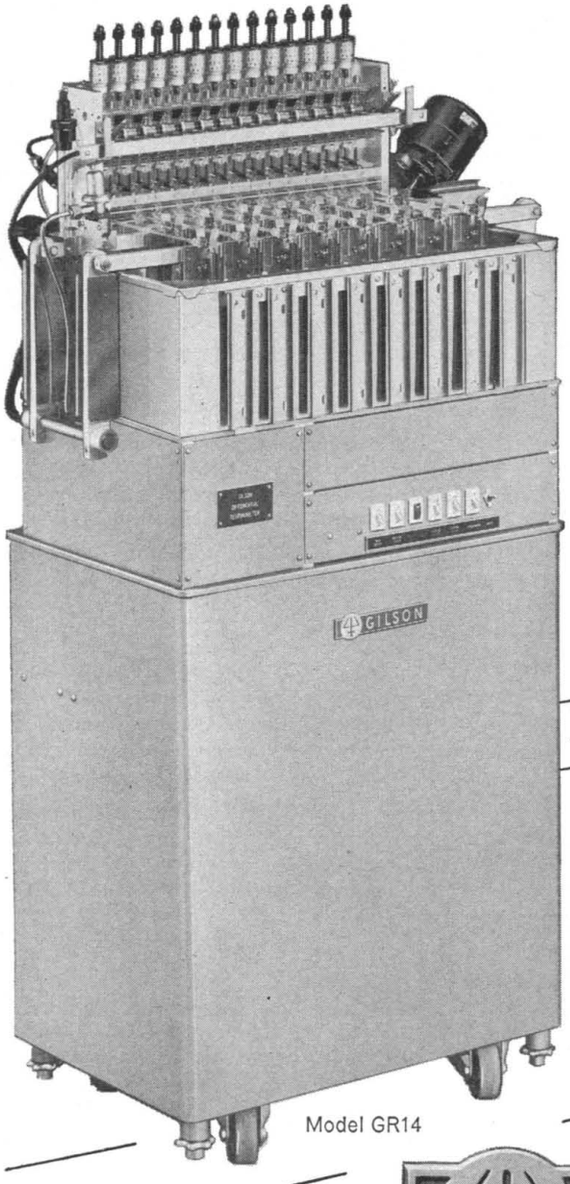
Reference

1. Ingredients are those suggested by A. Davis [*Let's Have Healthy Children* (Harcourt, Brace & World, New York, 1959), pp. 175–6], who recommends first beating noninstant skim milk into 2 cups of water. However, the instant variety seems to work well.

DON'T CALIBRATE!

rotate

and complete
an experiment
in the time
it formerly took
to set up



Model GR14

VOLUME-COMPENSATED DIFFERENTIAL RESPIROMETER

with
DIGITAL READOUT
in
NUMBERS of MICROLITERS

A calibrated micrometer returns the manometer fluid to its balanced position by movement of a piston in the enclosed volume. This obviates the need for calibration of glassware and simplifies calculations.

EXPERIMENTS under AIR:
Standard models connect the active flasks and one reference flask to stationary volumometers by means of capillary Tygon®* tubing. (Not applicable for use with gases which pass through Tygon.)

EXPERIMENTS under 100% Oxygen, Hydrogen, CO_2, etc.
All glass differential manometers with a reference flask for each active flask to eliminate gas penetration. Fewer stations per unit.

WRITE FOR MAIL!

GILSON MEDICAL ELECTRONICS
Middleton, Wisconsin 53562
or telephone: 608/836/1551

**Tygon is the registered trademark of the U.S. Stoneware Company*

GILSON

EUROPEAN Manufacturing Branch: Gilson Medical Electronics (FRANCE) • 69, Rue Gambetta • 95 -Villiers-Le-Bel, France

9 October 1970, Volume 170, Number 3954 **SCIENCE**

Will the World Come to a Horrible End?

Doomsday predictions have been popular since biblical times, but the sources of doom are changing. Famine, war, and pestilence have always been the old-time favorites—so much so that people have almost learned to live with them. The possibility of destruction of life on Earth by the impact of a large asteroid, or by the radiation effects of a close-by supernova or a solar superflare, has not evoked much public concern—which is perhaps surprising because the probability of such natural catastrophe, though small, is finite.

Instead, the current fashion seems to be to predict ecological disasters. For a while there was great concern that we would run out of oxygen because of the burning of fossil fuels. This particular concern was laid to rest recently and conclusively (*1*). Another concern for global oxygen came from the possible effect of DDT on marine phytoplankton (*2*). This particular problem was first raised by L. V. Berkner and L. C. Marshall, but is judged to be a problem no more (*3*). After many years of speculation and discussion, the effects of fossil-fuel burning on climate seem to be reasonably clear. While there has been an actual increase in the CO_2 content, the "greenhouse effect" of climate warming has been small, and even negative, because of the overwhelming effects of atmospheric dust which tends to cool the atmosphere (*4*). Even the long-range effects of CO_2 are likely to be reduced, partly because of the buffering action of the ocean, partly because of the increased photosynthetic absorption and storage by forests, while a limit to CO_2 production is also set by the prospective exhaustion of fossil fuels (*5*).

New technologies do not always produce major clear-cut global effects. For example, operation of a fleet of SST's might decrease stratospheric temperature somewhat because of the emission of water vapor; on the other hand, it might also increase stratospheric temperature because of the production of particles (*6*). But there is no evidence for sea-level changes or for adverse effects on life due to increased ultraviolet transmission.

Does this mean that we can now forget about ecological disasters? On the contrary; it is absolutely necessary to investigate each and every one of the side effects of our modern technology to its final conclusion and examine their possible influence on the global climate and on the ocean. There is probably nothing more important to man's future on this planet than an understanding of the long-range effects of his activities. The history of Earth gives abundant evidence of cataclysmic happenings. The stability of climate, for example, is not known, nor is it known how close we are to the limit where another ice age could be triggered. The possibility that we might inadvertently set off an irreversible reaction must constantly be kept in mind.

At the same time, we should be careful not to cry "wolf" needlessly or too often. The public and the media give special weight to statements from anyone who is a scientist, provided they make news. Scientific credibility can easily be lost by exaggerated claims and extravagant statements. We need to provide a voice of reason, not just of alarm. As scientists, we have the responsibility to speak up, but we also must know when to stop talking.—S. FRED SINGER, *Chairman, Committee on Environmental Quality, American Geophysical Union, Washington, D.C.*

References

1. W. S. Broecker, *Science* **168**, 1537 (1970).
2. L. C. Cole, *Bioscience* **18**, 679 (1968).
3. J. H. Ryther, *Nature*, **227**, 374 (1970).
4. J. M. Mitchell, Jr., in *Global Effects of Environmental Pollution* (Springer-Verlag, New York, 1970), pp. 139–155.
5. S. F. Singer, *Sci. Amer.* **223**, No. 3, 174 (1970).
6. V. D. Nuessle and R. W. Holcomb, *Science* **168**, 1562 (1970); also Summary of Study of Critical Environmental Problems, M.I.T. (July 1970).

What makes one constant temperature circulator better than another?

For one thing, the Lauda Duplex Pump.

All constant temperature circulators heat. Some, like the Lauda K-2/RD shown here, also cool. But this Lauda model can do even more. Its duplex pump enables it to circulate liquid to and from an external open bath, no matter whether the bath is positioned higher, lower or level with the circulator. Liquid will always return to the K-2/RD because its duplex pump provides simultaneous pressure *and* suction. You won't find this feature on many constant temperature circulators.

Another nice thing about this Lauda is its automatic liquid level control. It prevents accidental emptying of the bath by balancing pressure and suction, thereby keeping liquid levels constant in all parts of the system. These features add up to a better, more versatile circulator.

Besides the K-2/RD, which circulates liquids at temperatures from −10°C to 150°C, duplex pumps and the automatic liquid level control are also available in our N and WB series models. Some of these heat up to 330°C, or cool down to −130°C. Of course, solid state relays, excess load protection, drainage and flow control valves and stainless steel construction of all immersed components are standard on all Lauda Circulators.

Which Lauda is best for you? Get our free catalog to help you decide.

Write: Lauda Circulators, Division of Brinkmann Instruments
Cantiague Rd., Westbury, N.Y. 11590.
In Canada, write: Brinkmann Instruments (Canada) Ltd.,
50 Galaxy Boulevard, Rexdale (Toronto) Ont.

LAUDA Circulators

A DIVISION OF
BRINKMANN