small perturbation is sufficient to crush such a star out of existence; it is condemned to death from the first day of its life. The question seems to be one of extreme difficulty—a simple and beautiful theory of stability of mechanical systems is no longer sufficient; we have to investigate the thermodynamic stability by considering various physical factors affecting it. Jeans was the first who investigated this question mathematically, but it seems to me that here as in the former case he took a *regia via*. For instance he did not take into account the ionization energy of a star and the effect of viscosity in the more general case of vibration. Now it is evident that inside an atom and outside the nucleus we have (taken for the whole star) an enormous amount of stored energy—the energy of bound electrons—which is very easily tapped and locked by an ordinary mechanism of ionizations and captures. This storage of energy might be fatal for stability, but in some cases it may save a star from death, as everything depends upon the atomic properties of the stellar material. We may expect that in such a manner not only dwarfs but also ordinary giants may be rescued, while the question of the abnormally massive star still remains open.

These critical notes certainly can not diminish the value of Jeans's well-known contributions to astronomy: his general theory of the stellar interior, the theory of double stars, moving clusters, etc., have to be considered as the most important starting-points for future investigators. It is a real pleasure to look over again and again these masterly pages, to enjoy their mathematical elegance, forgetting for a moment that for their author they are merely subordinate parts of his "system."

Of prime importance are the pages (323–352) dealing with extragalactic (formerly "spiral") nebulae, where Jeans applies his old theory of gravitational instability to Hubble's new data on these "island universes." For Jeans the central "unresolved" parts of the spirals are something like white dwarfs of enormous size, where the atoms are as closely packed as in the interior of the companion to Sirius. The motions in spiral arms still remain unexplained on the basis of Newton's law.

Certainly "Astronomy and Cosmogony" is one of the most "personal" books on astronomy ever written. Theories and data, no matter how important, are not even mentioned if they are for one reason or another not interesting to the author. In the chapter on the Galactic system, the new and very conclusive results on the Galactic rotation are simply neglected, and the reader will be unable to find any reference to Lindblad's or Oort's work. It might be curious to note the character of data as quoted by Jeans in his book; he uses, for example, the very old data of Kepler on the velocity of planetaries (p. 27); statistical data on all kind of binaries are taken from a book published in 1918 (p. 282, etc.), and accordingly Polaris still is supposed to have a long spectroscopic period of twenty years (p. 305).

We may get great pleasure and benefit from studying a scientific book without being convinced by its author. We can not agree with Jeans's opinion on the structure of the stars, but we are delighted by the vigor and freshness of his ideas as well as by the elegance of his mathematics and his arguments. He takes the reader to the top of a high mountain and shows him an enormous perspective of the universe in space and time. The reader may doubt whether the distant objects he sees from above are really what his guide represents them to be, but he is indebted to him for an unusual and stimulating feeling of grandeur and exhilaration.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

THE USE OF FRESH PIG OVARIES IN THE EMBRYOLOGICAL COURSE

BECAUSE of the abridgment of the anatomical discipline growing out of the prevailing reorganization of the medical curriculum, and the consequent abandoning of certain laboratory exercises that had well-nigh become traditional, their place to be taken by more concise methods, the following brief suggestion relative to an introductory experiment in the course in human or mammalian embryology may be permitted. For a long time the simplicity of the idea underlying it deterred the writer from making formal allusion to it, but a trial of several years has proved its fitness to be brought to the attention of instructors elsewhere who might wish to utilize it—if they have not already done so—in the student's initial experience in that work.

It was while the members of a class were led to observe the several morphological phases of the corpus luteum in fresh pig ovaries, secured in considerable number from the abattoir, that the thought naturally presented itself of directing them also to open the larger unruptured follicles, to search for the cumulus with the aid of hand lens, and then to remove it for the microscopic examination of the egg and the adherent follicle cells. By carefully excising the large intact follicle and suddenly puncturing it on the slide, the egg cell may in many instances be easily dislodged and extruded. Operations and observa-

tions of this kind not only impress the student with such characteristics of the mammalian ovum as its diminutive size, for example, or with the image of its fresh state, which differs so effectively from the visions of the fixed and colored tissue that dominate the morphological imagination, but also bring him more concretely into contact with the physiological process of ovulation. True, the technical difficulties involved in the mastery of the exercise will register many failures in a large class, but the interest which it arouses, the ingenuity it calls into play and the competition which it engenders, all combine to make it a stimulating introduction to the embryological course.

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EASY SAMPLING OF PLANT TISSUE

THE usual procedure in preparing green plant tissue for sampling for chemical analysis has been to cut the material into one half to one inch segments with a razor or sharp knife. In some instances scissors have been used when the material has not been too bulky or tough. Obviously the preparation of material by this procedure has been a laborious task when the material has been very hard and fibrous or the amount of tissue was very large. In fact, the labor involved is so great that it has been practically impossible to secure samples for analysis when the bulk of material has been large.

Recently in this laboratory some samples of one hundred plants each of hubam clover were taken for carbohydrate studies, but because of the woodiness of the stems it was practically impossible to secure samples for analyses by the procedure mentioned above. The stems were so woody that they were chopped with difficulty with a sharp corn knife.

A paper-cutter having a ten-inch blade was tried and found to work very successfully. The samples of one hundred plants were cut into one half to three quarter inch segments in from three to five minutes. The paper-cutter has been tried on other material and has been used almost exclusively in preparation of green plant tissue for analyses. Samples of cowpeas weighing ten pounds have been prepared for sampling in ten minutes. Fibrous stems like those from large tomato plants have been prepared for sampling in a few minutes.

While the use of a paper-cutter for preparing samples may not be new to a number of laboratories, there are so many places in which the razor method is used that a suggestion to use a paper-cutter in the preparation of samples may be very helpful.

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SPECIAL ARTICLES

THE LEAKAGE OF HELIUM THROUGH PYREX GLASS AT ROOM TEMPERATURE

(Contribution from the T. Jefferson Coolidge, Jr., Memorial Laboratory, Harvard University.)

IN experiments upon the change in PV with pressure for helium at 0° C. in a container of Pyrex glass it was noted that even in so short a time as twenty-four hours the alteration in PV at atmospheric pressure through leakage of helium was perceptible. In Table I are given the products of the pressures in millimeters by the volumes in milliliters as determined on different dates. Since the pressure was considerably below atmospheric in the second series of experiments, in which the gas was expanded from 319 ml. to 392 ml., there can be no question of mechanical leakage. Furthermore the apparatus had been used previously for argon and showed no similar effect.

TABLE I

Date	P	PV	Time	dPV	Change per day
	mm.		days		Per cent.
Oct. 15, 1927	770	245513			
Oct. 18	"	245485	3	28	0.0038
Oct. 20	"	245470	5	43	0.0035
Oct. 23	"	245444	8	69	0.0035
Oct. 25	627	245418			
Oct. 29	"	245388	4	30	0.0031
Nov. 2	"	245373	8	45	0.0023

The capacity of the container in the first series of experiments was 319 ml., the interior surface about 257 cm^2, and the thickness of the walls, which were not very uniform, between 1.5 and 2.0 mm. Apparently the leakage per day per cm^2 was 0.04 mm^3.

Although the leakage of helium through Pyrex glass at elevated temperatures has been noted by various observers, we have been unable to find any reference to this effect at ordinary temperatures.[1] In order to make sure that what we observed was really diffusion through and not merely into glass we have made a roughly quantitative determination of the rate at room temperature in the following way: A spherical Pyrex glass globe of 1044 ml. capacity was filled with fairly pure helium to a pressure of 75 cm. at 20°, and then was sealed by fusion of the glass. A counterpoise of 1.4 ml. greater exterior volume than that of the globe was filled with argon at 79 cm. and also carefully sealed. Since the coun-

[1] Paneth, Peters and Günther state that glass dissolves more helium than neon at ordinary temperatures. *Ber.*, 60B, 808, 1927.