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films OF THE WEEK

Listing is for readers' information of new 16mm and 8mm films on science, engineering, medicine and agriculture for professional, student and general audiences. For further information on purchase, rental or free loan, write to distributor.

APOLLO 11. 16mm, color, sound, 28 min. Illustrates in selected photography and the words of participants the historical highlights of the Apollo 11 mission to the moon. Traces the mission from assembly of the spacecraft to the return of the astronauts with their lunar samples to the Lunar Receiving Laboratory. Principal emphasis is, however, man on the moon. Audience: general. Free loan from NASA field installations, or information from NASA Headquarters, Audio-Visual Branch, Code FAM, Washington, D.C. 20546.

CHEMICAL CHANGE: COMBINATION AND SEPARATION. Super 8mm only, color, silent. Seven cartridge films for Technicolor projector on "What Happens When Iron and Sulfur Are Heated?", "How Can You Change Potassium Permanganate?", "Where Did the Blue Go?", "Can Washing Soda Be Changed to Table Salt?", "Can Water Change Some Materials?", "Can Electrical Energy Cause Chemical Change?", and "Can Light Energy Change Some Materials?". Audience: intermediate grades, junior high. Purchase \$126 from Rand McNally & Co., P.O. Box 7600, Chicago, Ill. 60680.

THE NATURE OF SEA WATER. 16mm, color, sound, 28½ min. Explains the physical and chemical properties of sea water, and shows how their understanding is the basis of oceanography. Audience: general. Free loan from Public Affairs Officers in all Naval Districts.

OCEANOGRAPHY—THE STUDY OF OCEANS. 16mm, color, sound, 15 min. Presents a view of the many scientists who are now involved in studying what may be our last frontier—the oceans. These are: The meteorologist who studies the effects oceans may have on our weather; the physicist who studies ocean waves, tides and currents; the chemist who studies the mineral wealth found in the oceans; the biologist who studies ways of utilizing the vast animal and plant life found in the ocean; and the geologist who studies the ocean floor for clues as to how the earth was formed. Audience: intermediate, junior and senior high. Purchase \$150 from Journal Films, 909 Diversey Parkway, Chicago, Ill. 60614.

PACED TO LIVE. 16mm, color, sound, 18 min. Points up the danger and tragedy which can happen when rail-crossing signals are ignored, and underscores the hazard of disregarding the signs which have been installed to guide and direct our everyday movements with particular emphasis given to highway or railway crossings. Audience: general. Free loan from Motion Picture Bureau, Department of Public Relations, Union Pacific Railroad, 1416 Dodge St., Omaha, Neb. 68102.

SOCIAL DEVELOPMENT IN PAPUA AND NEW GUINEA. 16mm, b&w, sound, 19 min. A report on the role of education in the development of this fertile island territory. Audience: general. Purchase \$45 or rental \$2.25 from Films Officer, Australian News and Information Bureau, 636 Fifth Ave., New York, N.Y. 10020, or Western States, Press and Information Officer, Australian Consulate-General, 350 Post St., San Francisco, Calif. 94108.

LETTERS

to the editor

Perplexing googols

In his letter (SN: 8/23, p. 144) Walter Benjamin, apparently unconsciously, answered his own query on scientists' use of "googol." Numerical expression is more accurate than ordinary phrases or sentences. Benjamin's numerical expression of a googol (1×10^{100}) is correct; his phrase, "ten to the tenth to the tenth," is not. The latter is ten raised to the googolth power, i.e., a googolplex. A googol is ten to the tenth to the second power.

Walter C. Stanley
Gaithersburg, Md.

Volume three of "The World of Mathematics" by James R. Newman, contains an article by Kasner and Newman on page 1996. According to Newman, the number of electrons in Einstein's universe is only 10^{79} ; far less than a googol (10^{100}).

In addition, Kasner invented the googolplex, which is equal to 10^{googol} or $10^{10^{100}}$!

Moe Rubenzahl
Neversink, N.Y.

I was interested in learning who cooked up that large number, the "googol," and see that Edward Kasner, an American mathematician, did it. But Benjamin made a sizable mistake in saying what the googol is equal to.

Ten to the tenth power is 1 with 10 zeros after it, or 10 billion. So ten to the tenth to the tenth power is then ten to the ten billionth power, or 1 with ten billion zeros after it. Allowing an eighth of an inch for each digit or zero in this large number means it will be nearly 20,000 miles long, written longhand. A 1 with 100 zeros after it is only about a foot long.

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Before calculating the length of the googol, I estimated it to be several hundred feet long. After calculating the length of it, you could push me over with a feather. The first time I saw it was in an issue of SCIENTIFIC AMERICAN magazine about ten years ago. But otherwise, I have never seen it in actual use either, only in math textbooks. We do run into some sizable numbers on the job, which are written in powers of ten, but nothing like the googol. That is, indeed, quite a number.

M. D. Bernard Jr.
Merritt Island, Fla.

(The words certainly can be confusing. "Ten to the tenth to the tenth" can be taken to mean the quantity (ten to the tenth) raised to the tenth power, or $(10^{10})^{10}$, which equals 10^{100} , or one googol. By stretching slightly, however, one could say, as our correspondents point out, that it means ten raised to the (ten to the tenth) power, although strictly speaking that would refer to the phrase "ten to the (ten to the tenth)." In that interpretation, it would be $10^{(10^{10})}$, or $10^{10,000,000,000}$, a much larger number. It is still not as big as a googolplex, however, which, as writer Rubenzahl says, is ten raised to the googolth power, or $10^{(10^{100})}$. Ed.)

Circumcision: a reply

This is a reply to the many comments and questions raised by Dr. Berkes (SN: 7/5, p. 4) referring to my earlier brief letter refuting a bigoted criticism of circumcision as a cancer preventive.

The viral venereal concept of genital cancerogenesis first promulgated by me in September 1942 JOURNAL OF UROLOGY, was primarily based on a survey of a large number of prostatectomies performed by me in Brooklyn between World Wars I and II. The ratio of malignant to benign tumors of the prostate was 1.7 percent for the Jews vs. 20 percent for the white non-Jews. The latter corresponded closely to the national average. The great majority of the Jewish patients were immigrants from the more or less segregated ghettos and pales of Eastern Europe, with little opportunity to indulge in inter-ethnic sex relations.

The incidence of cancer of those organs that are vulnerable to venereal infections, comprising 25 to 30 percent of all cancers in this country, is much lower in Jews than in non-Jews. Penile cancer, though 2 to 6 percent of all male cancers in the U.S., and up to 30 percent in the Orient, is virtually unknown in Jews. Cervical cancer, reportedly nonexistent in a large number of Canadian nuns and very rare in

nonpromiscuous Jewish women, comprises 20 to 30 percent of all female cancers in this country and 40 to 60 percent in the Orient.

In support of the fact that sexual promiscuity and venereal diseases are important contributory factors in genital cancers, even Jews are vulnerable if they practice sexual promiscuity with virus carriers. Thus 73 percent of my Jewish cancer patients admitted G.C.

It was most erudite for a nonmedical scientist like Dr. Berkes to suggest including bladder cancer in the same category. Actually, a lower incidence of such cancers in Jews was first presented by me before the Section on Preventive Medicine at the American Medical Association 1964 meeting.

With the alarming increase in the number of homosexuals, and ano-rectal gonorrhea affecting 50 percent of them according to Kinsey; the rectum might also be considered a secondary sex organ. This may account for a lower incidence of rectal cancer among Jews as recently discovered.

At long last, genital cancers are now quite generally accepted as a viral venereal infection (like G.C., trichomonas, syphilis, etc.), transmitted from person to person through coitus. Since these cancers are much less common in Jews who are completely circumcised at birth, the logical conclusion is that the carcinogenic viruses apparently incubate in the bacteria-rich smegma secreted under the hard-to-sterilize foreskin of the uncircumcised male.

Recent findings of viruses in cancers of the prostate and cervix, and herpesvirus type 2 in penile smegma, seem to confirm my original concept first presented in 1942.

Replying to the letter from J. J. Griggs (SN: 7/12, p. 20), there is presently no vaccine available for immunization against genital viruses and cancers. The common venereal infections can generally be promptly cured by antibiotics; the viruses, however, are vulnerable to these drugs, apparently lodge and propagate stealthily in the various crypts of the organs involved, and many years later develop into cancer. Thus the availability of an effective vaccine seems far in the future.

Abraham Ravich, M.D., F.A.C.S.
New York, N.Y.

Pollution control

We have an urgent need for more pollution control with necessary funds. But we also have a more urgent need to face reality. Our pollution problem is growing by leaps and bounds. Despite this we are wasting anywhere from 65

cents to over 95 cents out of each tax dollar allocated.

At the same time we have had available low-cost technology which would end pollution at a small fraction of the costs we are now paying. We can build new and far more efficient treatment plants for less than 35 percent of the usual costs.

Secondary treatment can be added to existing treatment plants, or doubling the capacity, for less than 5 percent of the plant costs. Efficient use of this technology would remove the storm-water overflow problem without the need for separate sewers.

There's no alibi for pollution. There's no alibi for misuse of public funds.

August F. Vorndran Jr.
Consultant, Sewage, Wastes and
Water Treatment Technology
Webster, N.Y.

Photogenic but wrong

The cover (SN: 8/9) has on it a very interesting photographic comparison of the *Diplococcus pneumoniae* and an Asiatic Elephant (*Elephas maximus*).

I would like to point out the discrepancy of a fine example of an Asiatic elephant and the incorrect name associated with it, *Loxodonta africana*, which is the generic name of the African elephant.

J. D. Wallach, D.V.M.
Acting Associate Director
Animal Collection
Chicago Zoological Park
Brookfield, Ill.

Other discussable matters aside, I must at least remind you that the pachyderm pictured on the cover of the Aug. 9 issue is not *Loxodonta*. It is of course *Elephas*, the variety of proboscidae of Siam, Burma, and the Indian subcontinent. *Elephas* generally substitutes for *Loxodonta* in Tarzan movies and the like, it being much the more tractable animal, but needless to say, SCIENCE NEWS has no grounds for making the same error. And by no stretch of genetic differentiation can the sudden appearance of *Elephas* in Africa be justified.

Don deKoven
New York, N.Y.



Elephas maximus



Loxodonta africana