tained by the fact that the burro thyroids mentioned above resemble those responding to large amounts of thyrotrophic hormone but showed no signs of radiation damage.

The report of Evans *et al.* (*1*) in which shielded thyroids of total body x-irradiated rats had an increased I^{131} uptake is of course much stronger evidence of the indirect effect of ionizing radiations upon that organ. It does not, however, eliminate the possibility of a direct effect upon the release of thyroid-stimulating hormone by the anterior pituitary.

The fact that thyroids of burros after lethal doses of radiation appeared to be receiving a much greater stimulus than the two- to fourfold increase measured in this study, plus the fact that none of the present rat thyroids showed histological evidence of stimulation, suggests that the extent of the thyroid response to total body irradiation is probably a function of the amount and/or rate of irradiation. The observation that there is a difference in the response of the thyroid to photons of different quality (i.e., that x-rays were more effective than Co^{60} gamma rays) agrees with lethal dose studies (*5*) and studies on skin (*6*) and lens of the eye (*7*) sensitivity.[2]

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[2] John J. Lane and Moyer Edwards assisted in the chemical procedures. Charles S. Simons, Oak Ridge Institute of Nuclear Studies, calculated the dose of Co^{60} gamma rays. This report is published with the approval of the director of the Experiment Station, University of Tennessee. The I^{131} was obtained from the Oak Ridge National Laboratory on allocation from the U.S. Atomic Energy Commission.

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The Salinity of the Ocean

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Many authors (*1–3*) have noticed that the relative amounts of water, nitrogen, and volatile halides of volcanic origin approximate the composition of such volatiles in the atmosphere and hydrosphere. This fact has been used as a basis for arguments that the ocean was formed by the steady surface accretion of water from volcanic sources (*3*).

If the ocean were formed by volcanic action continued for a long time, it might be possible that nitrogen and halide too were collecting in the atmosphere and ocean respectively during the time the ocean was forming.

Table 1.

Amount in metric ton-atoms $\times 10^{-14}$	
Halide in ocean	7.6
Nitrogen in atmosphere	2.8

Though the terrestrial concentration of nitrogen is low compared to cosmic abundance of the element (*4–6*) it is quite plentiful compared to the inert gases.

Urey (*7–9*) suggested that nitrogen could be retained on the earth to the extent it is, as a metal nitride or as an ammonium halide. Both compounds could be held within the earth's crust under non-equilibrium conditions. Because the ammonium halides dissolved in water hydrolyze somewhat, they form acidic solutions that can rapidly penetrate basic rock. Many metal ions hydrolize too, but most of them also deposit insoluble silicates or carbonates which would lower the permeation rate of the solutions through the basic rock mantle.

By the time the water solution which originally might have contained ammonium chloride had reached the earth's surface, the solution would have become more basic and would consist of soluble alkali or alkaline earth halides and some ammonia besides gaseous hydrogen and nitrogen. The amount of nitrogen and hydrogen relative to ammonia would depend on the temperatures the solutions encountered.

As the remaining ammonia can be decomposed photochemically, provided that hydrogen can escape from the earth's gravitational field (*9*), atmospheric nitrogen plus some organic material results if reducing gases such as methane are present. The halide will be found in the sea. The amounts of nitrogen in the atmosphere and the halide in the sea should correspond on the basis of this picture. The degree of agreement is shown in Table 1. The weight of nitrogen in the atmosphere was taken from the work of Humphreys (*10*). The amount of halide in the ocean from Sverdrup, Johnson, and Fleming (*11*).

Since the amount of nitrogen is low relative to halide, nitrogen either may have escaped from the atmosphere with the hydrogen (*9*) or there is another accumulation of nitrogen on the earth.

The only accumulations that would appear to be large enough to contain 4.8×10^{14} metric ton-atoms of nitrogen would be the deep sea deposits. Based on sedimentation rates, Kuenen (*12*) estimated that deep-sea deposits laid down from Cambrian time should be of the order of 3 kilometers deep when compacted. Such deposits covering almost three-quarters (*13, 14*) of the area of the globe would weigh 1.8×10^{18} metric tons, assuming the compacted density of the deposits comparable to sandstone.

The most complete analyses of nitrogen in deep sea deposits are those described by Bradley (*15*) for the Globigerina ooze. The mean values for 11 cores was 0.022% ± 0.0012 nitrogen of weight of the sediment (of about 75% porosity). No perceptible variation of nitrogen percentage with depth except that caused by compaction was discernible in those cores. The chloride content of the sediments appears to be traceable only to the sea water occluded in them (*15*).

The nitrogen analysis data for Red Clay sediments are quite scanty for these most widely distributed ocean sediments. A Red Clay analysis for nitrogen reported by Andree (*16*) is 0.05% nitrogen for a dried core. The Blue Muds contain a considerable amount of organic material; however, no analyses for nitrogen seem to be available.

If one uses the value of 0.06% as the average composition of nitrogen for compacted sediments for all depths, the total quantity of nitrogen present on the ocean floor would amount to about 1.0×10^{14} metric ton-atoms accumulated from Cambrian times.

Perhaps such an assumption regarding the uniformity of nitrogen in sea sediments is not too bad for those sediments formed during the time that the atmosphere contained oxygen. It is almost certainly too low a value for sediments formed under a reducing atmosphere containing ammonia and methane, as postulated by Poole (*17*). The formation of insoluble organic compounds containing a considerable percentage of nitrogen could form in such gas mixtures (*18*) in the presence of light or by electrical discharges. Then the total nitrogen exclusive of possible sediments formed under reducing atmosphere would amount to about 3.8×10^{14} metric ton-atoms, which compares fairly well with the amount of halide in the ocean. It would appear that the available nitrogen on the earth's surface and the halide dissolved in the oceans could come from the same source of material (ammonium chloride). The accretion mechanism for the formation of the ocean also seems adequate to explain transport of both nitrogen and chloride to the earth's surface.

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The Effect of Exogenous Oxytocin in Blocking the Normal Relationship Between Endogenous Oxytocic Substance and the Milk Ejection Phenomenon

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Normally, in the lactating cow, a combination of favorable stimuli to the teats of the mammary gland and to the auditory and visual sense organs brings about a release of an oxytocic substance from the posterior pituitary gland (*1*). This material is discharged into the blood stream and carried to the udder system where it causes the myoepithelium of the alveoli of the mammary gland to contract and discharge their milk (*2, 3*). Thus, the milk is ejected into the gland sinus from which it can readily be removed by the milking act.

Recently an experimental procedure was carried out in which the response to the usual let-down stimulus became essentially nonfunctional. A cow was milked hourly with the aid of 20 iu oxytocin administered intravenously at each milking for a period of 156 hr (*4*). Following the experimental period the cow was milked in the usual manner at 12-hr intervals. This is a report of the recovery period.

Common usage has dictated that the milk ejected following a normal milking under the influence of exogenous stimuli be termed "residual." It would be more precise to designate the milk left within the udder which was not removed under the influence of exogenous oxytocin or that which was left following a stimulus liberating supramaximal amounts of endogenous oxytocic principal as "residual" and to reserve the term "complementary milk" for the milk removed under the influence of an exogenous stimulation which is in excess of that normally obtained. This terminology would agree well with physiological terminology used for other organ systems. Henceforth, we shall reserve the term "complementary milk" for that milk obtained in excess of that normally expected and which is removed by means of an exogenous stimulation whether it be collected following a normal milking or included within a normal milking in cases in which the stimulus was applied prior to milking.

Previous to the hourly experimental milking this cow was producing approximately 40 lb of 4.0% milk daily. When the cow was again milked in a normal manner 12 hr following the hourly milking routine only about half of the expected milk was obtained. A butterfat determination disclosed that this milk was low in fat (1.3%). The udder remained distended and hard to the touch. Despite the fact that very little milk had been obtained (3.8 lb), she lost milk from all four teats in the interim between this first and the next

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