Field Station, 470 Atlantic Avenue, Boston; and the Cambridge Field Station, Watson Laboratories, Air Material Command, 230 Albany Street, Cambridge, Massachusetts. Salaries range from $3,397 to $8,179 per year. To qualify, applicants must have completed (a) a full four-year college course with major work in physics, mathematics, or engineering science, or (b) at least four years of progressive technical experience in engineering or physics, or (c) any time-equivalent combination of education and experience. All applicants for the position of physicist must have completed 24 college semester hours in physics. In addition, all applicants must have had from one to four years of progressive professional experience in the appropriate field. Graduate study may be substituted for experience up to a maximum of two years of experience. No written test is required. Full information and application forms may be secured from most first- and second-class post offices, from civil service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Interested persons should ask for Announcement No. 1-34(47). Applications will be accepted until further notice by the executive secretaries of the Boards of U. S. Civil Service Examiners at the laboratories named above.

TECHNICAL PAPERS

The Common Cold: A Note Regarding Isolation of an Agent[1]

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For the past few months studies of the common cold have been in progress by the National Institute of Health. The infectiousness of nasal washings from cases of the disease and from laboratory materials has been investigated by intranasal inoculations of adult male volunteers[2] in a nearby correctional institution. Attempts to isolate and cultivate an agent or agents have been carried out at the Institute.

On January 13, 1947, nasal washings in sterile skimmed milk (*1, 4, 10*) were obtained from an individual within 24 hours of onset of cold symptoms. After laboratory studies to rule out, in so far as practical, the presence of dangerous pathogens, the unfiltered washings were given intranasally to 5 volunteers who had been in strict isolation in the institution hospital for 6 days. All subsequent groups had preliminary isolation periods of 6–8 days. After an incubation period of from 36 to 48 hours, all 5 volunteers developed symptoms and signs of minor upper-respiratory infection with considerable variation in severity.

All 5 complained of fatigue, nasal obstruction, and frequent expectoration. Three complained also of sneezing, headaches, coughing, and burning, watery eyes. Two experienced prodromal chilly sensations and hot flashes. Objectively, hyperemic obstructed nasal passages, red throats with prominent lymphoid follicles, and large quantities of postnasal mucus for 2–5 days were evident. Slight temperature elevations between 99° and 99.6° developed after onset. One volunteer suffered all the above complaints to a more severe extent, and in addition developed moderate rhinitis, a mild laryngitis for a day, moderate pharyngitis, episodes of sharp, sticking pains substernally for 3 days (X-rays normal), and a temperature elevation to 102° F. for a day.

Nasal washings in sterile skimmed milk taken within 24 hours of onset of symptoms in this volunteer were inoculated into embryonated hens' eggs along with 1,000 units of penicillin and 100 units of streptomycin.

After two passages by way of the allantoic cavity, there was an unusual number of deaths of embryos between the 4th and 6th days following inoculation. The fluids from these proved bacteriologically sterile, and several substrains were established. One of these substrains was tested in the 4th passage in human volunteers and produced a mild illness reminiscent of the original volunteer group. In fluids from the 5th egg passage, however, no obvious clinical disease was produced.

A second substrain was passed blindly every 3 days. After 8 passages allantoic fluids were tested in a group of volunteers with a failure to produce disease.

A third substrain was carried through 4 allantoic passages, transfers being made from the 5th to the 7th day following inoculation. Occasional embryos died between the 3rd and the 5th days. After the 4th passage a pool of allantoic fluid, when tested in volunteers, produced mild coryza and a slight elevation of body temperature. An equal number of volunteers given normal allantoic fluid remained well.[3] Two substrains were started from the allantoic fluid pool which produced the

[1] In this brief paper no attempt is made to review the literature. Some previous reports concerning the isolation of a possible agent or agents are listed under References (*2, 3, 5–9*).

[2] Certain criteria have been established for the selection of volunteer participation in the study. Volunteers must be healthy, physically fit, adult males between the ages of 20 and 40 years, who have given no history or physical findings of chronic sinusitis, allergic rhinitis, tuberculosis, or recent pneumonia. They must have no history of any respiratory infection for the past 6 weeks and no nasopharyngeal abnormalities.

We wish to acknowledge the generous cooperation of the volunteers as well as that of the Department of Corrections, District of Columbia, in making its facilities available for the human studies of the common cold.

[3] Volunteers, hospital attendants, and the nurse are purposefully kept unaware of the nature of the inoculum and the identity of the controls. The volunteers frequently are apprehensive for the first 24–48 hours following intranasal inoculation. In most control groups some mild and transient nasal irritative phenomena are observed during this period. Between 25 and 50 per cent of the controls have occasional sneezing and slight nasal obstruction with some hyperemia and swelling of the nasal mucosa. A few have complained of a headache. In several controls a brief temperature rise has occurred.

mild illness. Both of these were tested in groups of 7 human volunteers. All 7 in each group developed signs and symptoms comparable to the upper-respiratory infections seen in the original donor and the first volunteer group. However, in this total of 14 volunteers the illness was more severe and of longer duration, persisting 7–11 days. After 7–24 hours incubation, all complained of dry, irritated throats (without objective pharyngitis) and exhibited malaise out of proportion to physical findings. Within a few hours nasal obstruction and postnasal discharge with frequent expectoration developed and remained prominent during the course. All complained of frequent supraorbital headaches, moderate sneezing, and an infrequent, mild, nonproductive cough. Hoarseness was evident in 9, one of whom became aphonic for about 12 hours. Nine complained of burning, watering eyes (with mild conjunctivitis objectively) and vague chest aches without significant X-ray findings. Intervals of profuse serous rhinitis were observed in 5. Early in the illness, 5 complained of chilly sensations and hot flashes. Objective signs of pharyngitis, lymphoid follicular prominence, hyperemic obstructed nasal passages, and profuse postnasal discharge were observed in all. Temperatures between 99° and 100° F. occurred at irregular intervals in 12 volunteers. No significant urine or white blood count changes were apparent. An equal number of controls selected at random from among the volunteers received normal allantoic fluids with and without chorioallantoic membranes at the same time and under conditions identical with those receiving infectious material. These men remained well and showed no change in diurnal temperature variations.

Sixth-passage allantoic fluid produced a moderately severe upper-respiratory infection of 8–11 days duration in 15 of 16 volunteers inoculated intranasally.

Seventh-passage allantoic fluid produced a similar clinical disease in 14 of 16 volunteers. No decrease in severity of infection has been evident.

To date, 8 groups of volunteers totaling 60 individuals have been inoculated with allantoic fluids or fluids plus membranes from embryonated hens' eggs inoculated with the agent. Of the 60 individuals, 57 have developed a characteristic syndrome that has been consistent through the 8 groups. Simultaneously, 8 groups of controls totaling 48 individuals have been inoculated with noninfected allantoic fluids or fluids plus membranes. Except for mild, transient, nasal irritative phenomena in from 25 to 50 per cent of these, they have remained well.

The exact nature of the agent, whose presence in the allantoic fluids and in macerated allantoic membranes plus fluids was demonstrated by producing signs and symptoms in the human volunteers, has not been defined. Bacteriological cultures of allantoic fluids and of fluids plus macerated membranes have been sterile in thioglycollate and Casman's blood agar media. Preparations stained by the Giemsa and Macchiavello techniques, when studied microscopically have failed to reveal bodies suggestive of bacteria or the larger viruses.

The material has so far failed to produce symptoms in several strains of mice, hamsters, rats, cotton rats, guinea pigs, and rabbits. Allantoic fluids have failed to agglutinate chicken red cells, and the volunteers have shown no rise in antibody to either influenza A or B.

The infectiousness of the material is preserved, at least for several weeks, when rapidly frozen at −70° C. and stored in the frozen state at −50° C. Preliminary electron microscopic observations carried out by R. W. G. Wyckoff have shown characteristic particles in some active preparations which have not thus far been seen in preparations from normal allantoic fluids or from fluids of eggs inoculated with normal fluids. These particles are of the same general size as viruses of the influenza type but are readily distinguishable from them.

The substrains have been carried through several additional serial passages. Deaths of the embryo are quite infrequent, and grossly little, if any, change is noted in the embryo or membranes. Further testing of the material in human volunteers will be done as well as more extensive laboratory investigations.

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The Effects of Vitamins on Phosphorus Metabolism in the Chick Embryo: 1. Vitamin D and the Utilization of Inorganic Phosphorus

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As a preliminary experiment in the biophysical use of radioactive and stable isotopes, we have undertaken studies to obtain quantitative data relative to the effects of vitamins on the metabolism of phosphorus compounds in the developing chick embryo. Our initial work has been with vitamin D.

The biochemical action of vitamin D has been extensively studied (*1*). The most attractive hypotheses as to its mode of action seem to be that the vitamin accelerates the conversion of organic phosphorus into inorganic (*1, 4*) or, at least, intensifies the turnover of phosphorus in the bone (*5*). This work was performed with immature animals. Our experiments indicate that the vitamin accelerates the turnover of phosphorus in the developing embryo.

Large brown eggs (New Hampshire) were injected with 0.1 ml. of an isotonic solution of NaH_2PO_4 with an activity of 639.5 counts/second, or 0.12 microcuries. (The efficiency of our Geiger counter equipment, as determined by daily checks with the Bureau of Standards sample of Radium D and E, No. 26, was 9.84 per cent.) A portion of the eggs also received 0.1 ml. of propylene glycol containing 20 units of vitamin D;