

lung by way of the peribronchial and periarteriolar structures into the pulmonary tissue. Infection of the lung occurs under these conditions even though cultures from the lower trachea are sterile.

An abundant lymphatic system can be demonstrated by the injection of India ink into the submucosa of the trachea. This plexus extends from the epiglottis downward as far as the bifurcation of the trachea and connects directly with similar plexi in the submucosa of each bronchus. With further subdivisions of the bronchi, the condition noted above is duplicated. At the points of bifurcation throughout the cartilage-bearing bronchi, anastomotic branches connect the plexi with the periarteriolar lymphatics, and other branches pass directly to the regional lymph glands. Thus a short circuit around the valves of the deeper pulmonary lymphatics is provided.

The distribution and extension of these tracheal lymphatics can be demonstrated equally well by Gram-stained sections prepared from an animal inoculated through the submucosa of the trachea by injection or insufflation of virulent pneumococci. The presence of the organisms shows the distribution of the infection through the lymphatics of the submucosa of the trachea, past the hilum of the lung, into the pulmonary parenchyma. Thus a direct pathway of infection is provided. On the other hand, the manner in which the lymphatic plexi are sharply demarcated at the bifurcations of the trachea and bronchi suggests that this lymphatic system may also serve as a protective mechanism, since, undoubtedly, many of the invading bacteria are, at these points, diverted to the protective regional lymph glands.

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The life of the white mouse.

By **W. B. KIRKHAM** (by invitation).

[From the Osborn Zoölogical Laboratory of Yale University, New Haven, Conn.]

White mice may give birth to young every month in the year, but most of the litters come during the warmer months. Males

and females are both sexually mature when about six weeks old, and in females of that age, ovulation occurs regardless of whether or not there has been a previous pairing. The gestation period of non-suckling mice is from 18 to 21 days, so that the first litter may be born when the parents are about two months old, and in all cases of normal, paired animals a litter has appeared before they were three months of age. This first litter may be large (12) or small (2). If the first litter includes more than five young (the average size of litters among white mice) the succeeding litters from that female are usually above the average number of young, but the reverse of this proposition is sometimes true and at other times not. Sixteen litters seems to be the limit for one female to bear, and some stop before reaching that number. The total number of young produced may reach 80, and appears to bear no relation to the size or the total number of litters. Females which are allowed to suckle their young, cease to bear at 18 to 22 months of age, after producing 12 to 16 litters, while those females whose young are removed as soon as found usually die before they cease to bear, but in the rare instances where such females survive, their litters come nearer together, but reproduction stops at an earlier age, so that the total number of litters produced is within the limits stated above. Females appear to be somewhat shorter lived than males, but animals of both sexes if healthy at birth, given reasonably good care, and protected from contagious diseases, have an expectation of life of about two years.

Females suckling young frequently fail to at once again become pregnant, due to some influence from the mammary glands which inhibits ovulation, and in all cases where more than two young are being suckled and the female becomes pregnant, the implantation of the embryos is retarded for about nine days, until the young cease to suckle, and a corresponding prolongation of the gestation period occurs, as compared with that of non-suckling females. Both of these phenomena appear to be protective for the parent organism, since females whose young are removed at birth usually bear litters in such rapid succession that they die of exhaustion before the termination of the reproductive period.

Males and females which were never allowed to pair have lived the same length of time as other animals, and have shown no peculiarities of behavior or appearance.

Healthy animals, for experimental work, are only to be secured by individual selection, as not all members of a litter are equally healthy, but too rapid breeding of healthy animals is sure to produce weak offspring. Extreme heat will kill mice quicker than cold. Pulmonary diseases must be guarded against by rapid removal of infected animals. Sarcomas have also caused the death of a number of animals in the course of this investigation, usually not appearing in animals less than a year old. Tape-worm cysts have been found in the livers of some mice, but seemed to have been without effect on the general health and reproductive activity of their hosts.

A few female white mice have shown a peculiarity common in yellow mice, sterility accompanied by extensive laying down of fat, after having four to six litters. The cause of this behavior is at present unknown.

105 (1565)

Reaction of cells to the galvanic current in tissue cultures.

By SVEN INGVAR (by invitation).

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By applying a weak constant galvanic current (strength 2-4 billionths of an ampere, density approximately $1/1000-1/2000$ δ , nonpolarizable electrodes) to tissue cultures made according to Harrison's method, the following observations were made:

The galvanic current has a directing influence upon the *cell and fiber outgrowth in the cultures* so that this occurs almost entirely *along the lines of force* in the galvanic field. Whereas in the control preparations the outgrowth occurs in all directions, cell movements under the influence of a galvanic current take place toward the anode and the cathode. The cell processes growing toward the anode show morphological differences from those growing toward the cathode. A new biological cell character may in this way be revealed.

If a weak electric current by means of a single conductor is drawn through the culture, the outgrowth of the fibers and cells