for the formation of nickel chloride and polymeric phosphorus dichloride. The tetrakistrichlorophosphine nickel appears to be nonvolatile.

The compound is readily soluble in organic solvents. With dry, air-free, inert solvents such as benzene, carbon tetrachloride, pentane, and cyclohexane, there is only very slow decomposition at room temperatures. On heating the solutions, decomposition is rapid, to give black precipitates of nickel. The solubility in pentane at $-50°$ C is 0.9 g/100 g pentane. In solution in organic solvents such as alcohols and ketones, decomposition leading to green and brown solutions is quite rapid. With carbon disulfide, rapid blackening of the solution occurs; the products of this reaction have not been studied in detail, but the reaction appears to be similar to that reported for nickel carbonyl and carbon disulfide (*5*), where polymeric carbon monosulfide was formed.

Determination of the molecular weight by the method of freezing point depression in benzene gave a value of 600 ± 20, corresponding to the monomeric state of $Ni(PCl_3)_4$ (theoretical mol wt, 608).

Single hexagonal crystals of $Ni(PCl_3)_4$ several millimeters long can be grown by slow cooling of benzene solutions from 25° C to 10° C. The density of the compound, determined by the standard pycnometer method of weighing in water, is 2.10 ± 0.01 at 25° C.

The magnetic susceptibility of $Ni(PCl_3)_4$ at 25° C has been measured by the Gouy method. Air ($K = +0.029 \times 10^{-6}$ cgs) and water ($K = -0.72 \times 10^{-6}$ cgs) were used as standards, and as a check on the calibration curve of field vs. current, for the magnet used. In all cases the field was varied from about 5,000 to 9,500 oersteds, and the susceptibility values obtained were independent of field strength, showing the absence of ferromagnetic impurities. Measurements made after successive crystallizations from pentane solutions gave a value for the specific mass susceptibility χ for $Ni(PCl_3)_4$ of -0.355×10^{-6} cgs. For PCl_3 under the same conditions, χ is -0.455×10^{-6} cgs; the molar susceptibilities χ_m are then -216.0×10^{-6} cgs and -62.3×10^{-6} cgs for $Ni(PCl_3)_4$, and PCl_3, respectively. In the compound $Ni(PCl_3)_4$ the apparent molar susceptibility of nickel is hence $+33 \times 10^{-6}$ cgs. The measurements thus show complete filling of the nickel *d* orbitals and the absence of unpaired electrons, confirming that nickel is in the zero-valent state in the compound; the small paramagnetism may be of the temperature-independent type found in $KMnO_4$, $K_2Cr_2O_7$, etc.

Related reactions. Evidence has been obtained for intermediate replacement compounds in the reaction of nickel carbonyl and phosphorus trichloride, although these have not as yet been isolated. Preliminary investigations of the reaction of nickel carbonyl with phosphorus tribromide directly and in pentane solution have been made. At room temperature, the reaction is rapid, CO being evolved with effervescence, and a yellow solution is formed which later turns orange-red as the reaction proceeds. No bromide replacement compounds could be isolated from these solutions, however; if the orange-colored solution is warmed or allowed to stand for an hour or so, even at 0° C, decomposition occurs and a brown flocculent precipitate is produced.

Tetrakistribromophosphine nickel, $Ni(PBr_3)_4$, has been made by the reaction of PBr_3 and $Ni(PCl_3)_4$ and will be described subsequently, together with the preparation and properties of other complexes of nickel carbonyl and iron pentacarbonyl formed with the lower halides of phosphorus and antimony.

With AsF_3, $AsCl_3$, and $AsBr_3$, nickel carbonyl reacts readily in both liquid and vapor phases, liberating CO and forming black products; no definite compounds have been isolated.

No replacement compounds have yet been isolated from the reaction of PCl_3 with molybdenum, wolfram, and chromium hexacarbonyls at temperatures up to 150° C; solid products obtained appear to be mainly the metal phosphides.

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The Respiratory Effect of Ro 2-3198 (3-Hydroxy Phenyldimethylethylammonium Bromide) in Syncurinized Dogs[1]

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Most anesthesiologists find little use for neostigmine in the treatment of overdosage of curare products, being satisfied with augmented or controlled respiration for a period of time. Furthermore, the undesirable cholinergic effects and prolonged action of neostigmine have limited its use in anesthesia practice.

However, a short-acting anticurare drug with minimal undesirable cholinergic responses and low toxicity would most assuredly have a place in the treatment of depression from curare. A long series of phenolic quaternary ammonium salts has been studied, and among these derivatives Ro 2-2561 (3-hydroxy phenyltrimethylammonium bromide) (*1–4*), Ro 2-2017 (3-acetoxy phenyltrimethylammonium methylsulfate) (*5–7*), and Ro 2-3198 (3-hydroxy phenyldimethylethylammonium bromide) (*2–4*) were found to be effective in antagonizing curare activity.

We became interested in the response of the anticurare drug Ro 2-3198 to syncurine (bistrimethylammonium decane bromide) because its curarelike ac-

[1] Preliminary report.

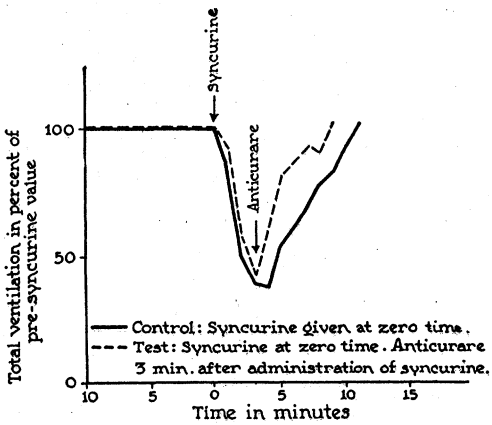

FIG. 1. Respiratory response in syncurinized dogs with and without Ro 2-3198. Total ventilation expressed as percentage of presyncurinized value.

tion cannot be antagonized or inhibited by anticholinesterases such as eserine and neostigmine (*8*). Paton and Zaimis (*8, 9*) claimed that C-5 (bistrimethylammonium pentane diiodide) is an effective antidote, but it seems to have no useful place in anesthesia because of its autonomic blocking effect, which might be a contributory factor in operative shock (*10*).

We performed a series of experiments in an attempt to evaluate the anticurarelike action of Ro 2-3198 in syncurinized dogs. The minute volume and tidal air were used as an index of its effectiveness.

Mongrel dogs (15–31 lbs) were anesthetized with sodium nembutal (6.5%) administered intravenously at a dosage of 1 ml/5 lbs body weight, and premedicated with atropine sulfate.

A Magill endotracheal tube with cuff was inserted into the trachea, and the cuff was then inflated with air until there was no leakage around the tube. The tube was tightly connected to the standard Benedict-Roth basal metabolism machine. Continuous kymographic tracings were recorded until a constant respiratory volume was obtained for at least 10 min. Syncurine was then administered in the control group, and syncurine followed by anticurare (Ro 2-3198) in the testing group. In both groups the kymographic tracings were continued until the total ventilation or minute volume returned to the presyncurine level. The

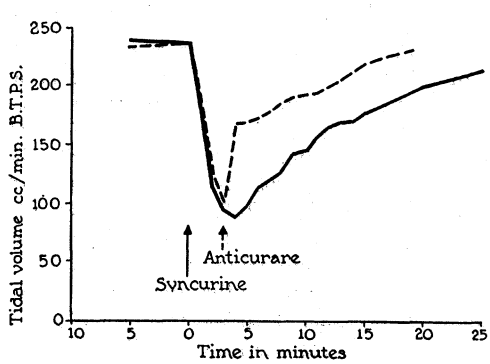

FIG. 2. Effect of syncurine and anticurare on tidal volume.

respiratory volume and the tidal air were calculated and corrected to BTPS (body temperature, ambient pressure, and saturation).

Both syncurine and Ro 2-3198 were injected intravenously through the antitibial vein over a constant period of 1 min. The interval between the start of the administration of syncurine and the start of Ro 2-3198 was 3 min. Syncurine was given at zero time.

The dose of syncurine was chosen arbitrarily as 0.03 mg/lb body weight, which is about that for man based on body weight. A dosage of 0.15 mg/lb body weight was used for Ro 2-3198.

Fifteen experiments were done in 6 dogs (6 control and 9 testing experiments).

The results of the respiratory responses to Ro 2-3198 in syncurinized dogs were presented in average curves.

1. The effect of syncurine on respiration in anesthetized dogs is short in duration, reaching maximal respiratory depression by the fourth minute after the start of injection of syncurine. From this point, the minute volume gradually increases and returns to normal in 10.83 min (10.83 ± 23.64%) after the administration of syncurine (Fig. 1).

2. In the testing group in which Ro 2-3198 was given 3 min after the injection of syncurine, an immediate response was obtained. A 25% increase in minute volume was noted by the end of the administration of Ro 2-3198 (whereas in the control group the minute volume was still decreasing). In the testing group the minute volume returned to normal in 6.89 min (6.89 ± 19.89%) (Fig. 1). These differences are statistically significant.

3. The respiratory depression is chiefly manifested by the decrement in tidal volume. After the injection of Ro 2-3198 there was an immediate increase in tidal volume (Fig. 2). In each trial the effect was observed within 20–30 sec of the beginning of the injection of Ro 2-3198 (Fig. 3).

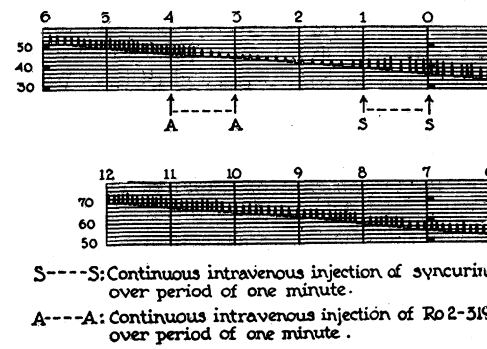

FIG. 3. Kymograph tracing on anesthetized dog before and after injection of syncurine (C10) and Ro 2-3198 as antidote (read from right to left).

4. The fact that the total ventilation returned to normal before the tidal volume could be explained by the increment of respiratory rate.

5. Repeated doses of syncurine (without Ro 2-3198) produced a constant respiratory depression. This is

contrary to the effects of repeated doses of syncurine on grip strength as reported by Macfarlane *et al.* (*4*). This may explain in part some of the clinical difficulties experienced with syncurine, since repeated doses are less effective in producing relaxation and at the same time respiration continues to be depressed.

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Liquid Nitrogen as a Tool for Obtaining Homogeneous Bacterial Suspensions

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In studies on the physiology, serology, and pathogenicity of microorganisms, uniform suspensions are necessary but frequently difficult to obtain. In some serological work with *Erysipelothrix rhusiopathiae* we experienced difficulty because of autoagglutination. In a search for better methods of preparing satisfactory antigens for agglutination studies, the use of liquid gases suggested itself. Liquid nitrogen was chosen because of its temperature, its chemical inertness, and its rapid evaporation. Other liquid gases would probably serve as well.

The method used for preparing suspensions was as follows: A washed suspension of killed organisms was centrifuged, the supernatant liquid removed, and the organisms transferred to a mortar. A small amount of liquid nitrogen was added, and the frozen organisms were ground with a pestle until they had thawed. The procedure was repeated, and the bacteria were resuspended in saline. Occasionally the organisms were dried by washing with cold acetone before being subjected to liquid nitrogen treatment.

As compared to controls, the preparations obtained by this method were more finely dispersed, and the organisms remained in suspension for long periods.

Living cultures of mycobacteria, both virulent and avirulent, harvested from slants of Petragnani medium, were successfully suspended by the same method. Microscopic examination showed clumping to be negligible. The organisms retained their viability as shown by growth on artificial media.

By this method we have also obtained homogeneous suspensions for other serological tests, for physiological studies, and for animal inoculation. Erythrocytes treated with liquid nitrogen were completely lysed, and from such cells large quantities of stromata could be obtained by centrifugation.

The rapid evaporation, the low temperature, and the chemical inertness of liquid nitrogen make it a valuable agent for producing homogeneous suspensions of bacteria.

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Free Selection of Nutrients by Hereditarily Obese Mice

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The production of a strain of mice throwing animals that show hereditary obesity has been recently described (*1*). It may be useful to recall that they originated from the crossing of "V stock" males to offspring of "V stock" males and "C57BL/6" females. The strain (Ob ob) throwing obese animals presents a variety of characteristics corresponding to V stock genes: "nonagouti," "leaden," "piebald spotting," "waltzing," and "waved-1," as well as the "fuzzy" gene.

Very marked differences in weight between "obese" and "nonobese" members of this strain are soon apparent. For example, young adult obese mice weigh 38–56 g, whereas the weights of young adult nonobese mice are in the 16–26-g range.

In order to discover a lead to possible nutritional and metabolic abnormalities associated with this hereditary obesity, a free-selection experiment was instituted, using 10 obese and 7 nonobese animals. The animals were placed in individual screen-bottomed cages at constant temperature and humidity. They received three "diets," I, II, and III, representing essentially pure fat, carbohydrate, and protein fortified with minerals and vitamins. Diet I consisted of casein, 75%; dried defatted liver powder, 15% (representing 90% of the total calories as protein); corn oil, 5%; cod liver oil, 1%; salt 4%. Diet II consisted of sucrose, 90% (representing 90% of the total calories as carbohydrate); corn oil, 5%; cod liver oil, 1%; salt, 4%. Diet III consisted of lard, 57%; corn oil, 15%; cod liver oil, 2% (representing 90% of the total calories as fat); casein, 15.5%; dried defatted liver powder, 3.0%; salt, 7.5% (*2*). In addition, the following vitamins were added to all

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