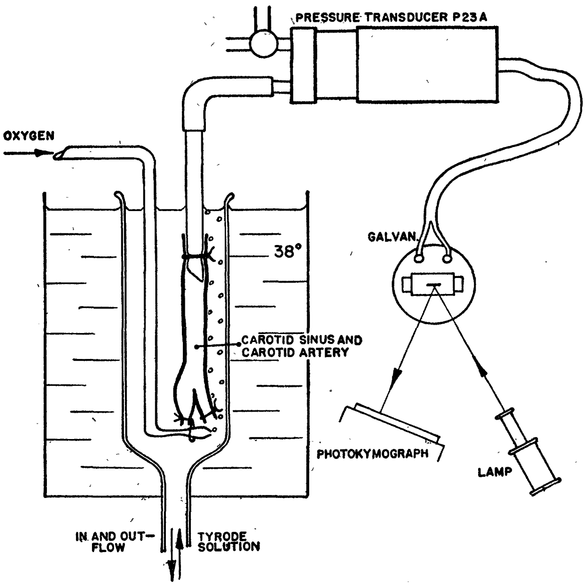

FIG. 1. Arrangement of the measuring technique used in the experiments. The Statham pressure transducer type P 23 A with Control Box CB 7 are used. The galvanometer is the Micromoll Kipp.

tors are located are the fundamental factors for the reflex automatic regulation of the systemic arterial pressure.

Experiments have been performed in order to investigate more directly the action of epinephrine and norepinephrine on the tone of the arterial wall of the carotid sinus area.

The efferent arteries of the carotid sinus are ligated, and the cephalic end of the corresponding common carotid artery is connected with a Statham pressure transducer. The blinded carotid sinus, the segment of common carotid artery, and the pressure transducer are filled with Tyrode solution at an internal pressure of about 10 mm Hg. The internal pressure variations are registered by means of a mirror galvanometer connected with the pressure transducer (Fig. 1).

Solutions of pure 1-epinephrine or 1-norepinephrine bitartrate were applied *in situ* on the carotid sinus area or added to the Tyrode solution in which the carotid sinus preparation was immersed.

As shown in Fig. 2, 1-norepinephrine bitartrate in concentrations of 2.10^{-6}, acting on the arterial wall of the carotid sinus area, induces a rise of intra-

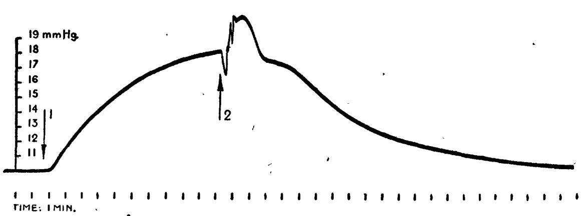

FIG. 2. Registration of the internal pressure recorded during an experiment. The pressure scale represents mm mercury of internal pressure. At 1 addition of 1-norepinephrine, in concentration 2.10^{-6} followed by a rise of internal pressure. At 2 washing out with Tyrode solution, and return to previous levels of the internal pressure.

carotid sinus pressure up to 8–10 mm Hg. After removal of the norepinephrine, the internal pressure returns progressively to previous levels. The same observations have been made with 1-epinephrine.

These experiments show that 1-norepinephrine and l-epinephrine applied to the carotid sinus induce a contraction of the arterial wall of this area. This contraction of the arterial wall provokes the stimulation of the carotid sinus pressoreceptors and thus the reflex fall of the systemic arterial pressure observed in previous experiments (*1*).

These findings emphasize the fundamental importance of the tone and resistance to stretch (distensibility) of the arterial wall of the carotid sinus in the reflex automatic regulation of blood pressure.

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The Red Cloud Sand and Gravel, a New Pleistocene Formation in Nebraska

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Recent studies of the stratigraphy and paleontology of the Pleistocene of Nebraska have resulted in additional data that require further clarification and partial revision of the Grand Island sand and gravel formation (*1, 2*) in order that there may be no confusion as the result of varying usage of the term.

Lugn's type locality of the Grand Island formation is situated southeast of Grand Island, Nebraska, in the lower slopes of the bluffs of the Platte River Valley, where it is overlain conformably by the silts of the Sappa formation (*3*)—equal to Upland as formerly used by Lugn (*1*)—with a comparatively transitional contact. Only the upper part of the sand and gravel sequence is exposed above valley level, however. Lugn included in the Grand Island all the sand and gravel between the Sappa above and the Fullerton silts below, in part exposed at the type locality and in part encountered in test holes in the Platte River Valley to the northwest. The Grand Island was classified as essentially a time equivalent to the Kansan till of the glaciated area. Lugn (*1*) also correlated as uppermost Grand Island the sands and gravels in northeastern Seward County which rest above a comparatively thin Kansan till and are overlain by the Sappa formation.

Condra, Reed, and Gordon (*4*), as a result of extensive subsurface studies, continued the usage of Grand Island according to Lugn's conception and applied the name early Kansan sand and gravel to post-Aftonian sands and gravels deposited ahead of the advancing Kansan ice sheet and overridden by the Kansan ice in eastern Nebraska.

Test drilling indicated that the early Kansan sand and gravel could be traced westward into the lower part of Lugn's Grand Island of the basin area in the type locality, and that the upper part of the Grand Island of Lugn could be traced eastward into the glacial section, where it rested on eroded Kansan till in the areas marginal to the periglacial region. Similar deposits were found to be widely distributed farther northeastward well within the Kansan till area in channels cut deeply into Kansan till where the channels were closely associated with the present major valley systems. Therefore Condra and Reed (*3*), in their revision of the paper by Condra, Reed, and Gordon (*4*), applied the names "Upper" and "Lower Grand Island" rather than restrict Grand Island and add a new name or perhaps two new names in the glacial section. Frye, Swineford, and Leonard of the Kansas Geological Survey (*5*) have used Grand Island in a restricted sense to apply only to the upper part of the Grand Island of Lugn.

Barbour, Schultz, and Stout, paleontologists at the University of Nebraska State Museum (*6–8*), have recognized for some time that the fossil vertebrates associated with the "Upper Grand Island" deposits of Condra and Reed (*3*) were closely related to those of the Sappa. More recently Schultz, Lueninghoener, and Frankforter (*9*) indicated that the fauna from gravels ("Lower Grand Island") in the vicinity of Red Cloud, Nebraska, was clearly distinct from the "Upper Grand Island" fauna in the same general region of south-central Nebraska, thus strongly suggesting that the advance of the Kansan ice sheet had a profound influence on the vertebrate fauna of the region. Moreover, it is evident that the fossil vertebrates from the "Lower Grand Island" are much more closely related to the early Pleistocene (Broadwater and Fullerton) forms than to those of the "Upper Grand Island."

Stratigraphic and physiographic studies made by the staffs of the Nebraska State Geological Survey and the University of Nebraska State Museum indicate that the upper and lower parts of the Grand Island as defined by Lugn occur in normal stratigraphic succession (younger above and on older below) in the basin areas where the Grand Island is only partially exposed. However, in the areas west and south of the east-central Nebraska Basin, along the North Platte Valley in the vicinity of Broadwater and along the lower stretches of the Republican Valley in south-central Nebraska, the "Upper" and "Lower Grand Island" occur in physiographic succession. That is, the "Lower Grand Island" with its typical fauna is exposed as comparatively high-level, valley-side, terrace deposits that are usually mantled unconformably with an upland phase of the Sappa silt formation, whereas the "Upper Grand Island" with its typical fauna occurs as a comparatively low-level channel deposit in a terrace-fill—Terrace-4 of Schultz, Lueninghoener, and Frankforter (*9, 10*)—mantled conformably by the alluvial phase of the Sappa silt formation. The Pearlette ash occurs locally in both phases of the Sappa.

In view of the physiographic, paleontologic, and stratigraphic evidence we conclude that (1) the widespread advance of the thick Kansan ice sheet had a profound effect on the fauna of the region, resulting in a radical change in genera and species of vertebrates; (2) that the thick mantle of Kansan till deposited in eastern Nebraska completely deranged preexisting drainage and that an essentially new drainage pattern developed with late Kansan glacial retreat; (3) that sedimentation was most active in the periglacial regions at the times of glacial advance and glacial retreat; and (4) that the stream valleys more distant from the Kansan ice sheet, or so located that the Kansan ice neither restricted nor dammed them, tended to be overdeepened and filled at lower levels at the time that larger amounts of water and sediment were again available during the Kansan ice retreat.

Thus it is indicated that the Kansan glacial history of Nebraska and surrounding states is somewhat more complex than was formerly thought. Under these conditions and in the light of the paleontologic differences, it no longer suffices to include all the sediments in one formation, as first suggested by Lugn (*1*). Moreover, the expedient of dividing Grand Island into "Upper" and "Lower Grand Island" as suggested by Condra and Reed is inadequate and has been widely criticized. Thus it is herein proposed that the name Grand Island be restricted to the "Upper Grand Island," and the name Red Cloud sand and gravel be applied to the "Lower Grand Island" of Condra and Reed, which includes the pro-Kansan sand and gravel. The Red Cloud sand and gravel formation thus was deposited while the Kansan ice sheet was advancing; and the redefined Grand Island sand and gravel formation, during the retreat and waning of the Kansan ice sheet (late Kansan) and early Yarmouth (Sappa) time.

The Red Cloud sand and gravel of the periglacial region appears to be equal in age, at least in part, to the pro-Kansan sand and silt (Atchison formation) in the glaciated area of eastern Kansas (*11*) and Nebraska. Paleontological studies by Frankforter (*12*) in eastern Nebraska indicate that the vertebrate fossils from pro-Kansan sand and gravel are similar to those found in the Red Cloud formation in south-central Nebraska.

The type locality of the Red Cloud sand and gravel is located in Red Cloud Township 2½ miles west-northwest of Red Cloud in E ½, sec 28, T 2 N, R 11 W, Webster County, Nebraska. The section exposed at the type locality is as follows:

1. Covered interval to hilltop east of pit 18 ft; probably represents thin Peorian and remnants of Loveland.
2. Sappa silty clay, present locally as remnants preserved in depressional areas on pre-existing surface; thickness 1–4 ft.
3. Red Cloud sand and gravel (new name), grades from sand to medium coarse gravel, gray in color throughout except for upper few feet which is strongly weathered to a yellowish-brown, indicating a profile of weathering and unconformity at its top; thickness 33 ft exposed in sand and gravel pit.

4. Niobrara formation (Cretaceous) chalky shale, erosional top; 32 ft exposed above terrace level along east side Indian Creek.

The Nebraska Geological Survey, the University of Nebraska State Museum, and the Department of Geology at the University of Nebraska have approved the foregoing restriction of the term Grand Island and the adoption of the new name Red Cloud sand and gravel, and these names will be used in future Nebraska publications as herein defined. It may be necessary to apply the hyphenated term Red Cloud–Grand Island to some subsurface intervals in the Pleistocene basin areas where the two formations cannot be separated satisfactorily. However, the subsurface studies of the Nebraska Geological Survey indicate that the Red Cloud–Grand Island interval in many test holes can be separated into a lower sand and gravel grading from coarse-textured at the base to fine-textured above, overlain by a higher sand and gravel with similar textural characteristics.

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Apparatus for the Culture of Bacteria in Cellophane Tubes

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Highly potent botulinum toxin has been produced by Wentzel and Sterne, who grew *Cl. botulinum* in cellophane bags immersed in corn-steep liquor (*1*).

In a previous publication (*2*), we have shown the possibility of obtaining high-titer tetanus toxin with the above-mentioned technique but using a different medium. During the course of this investigation, we were led to increase the ratio: cellophane surface/vol of medium; the result of our attempts is evident in the apparatus shown in Fig. 1, which can be described as follows:

A 4-ft length of 64-mm diam Pyrex tubing is fitted at both ends with flared openings for No. 9 rubber stoppers; two side outlets for ¼-in. rubber tubing are also provided at the two ends of the glass tube.

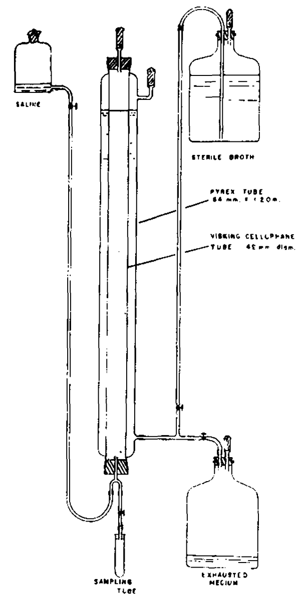

FIG. 1.

Into this glass tube is fitted a 42-mm diameter Visking cellophane tubing with the ends intussuscepted over the flared openings of the glass tube, which is now fitted with one-holed rubber stoppers. One of these (which is called the bottom) receives a Y-tube for supplying the inner tube with saline. The other stopper (top) is fitted with an air filter (funnel type).

Rubber tubing connects one end of the Y-tube to a 2-liter bottle filled with saline; the other outlet of the Y-tube is fitted with a device for aseptic sampling.

Similar rubber tubing is used to connect one branch of a T-tube on the lower side of the outside (glass) tube to a 12-liter bottle containing the fresh culture medium. The other outlet of the T-tube is also equipped with a 12-liter bottle for collecting the exhausted medium.

The upper side outlet of the outside glass tube receives an air filter. All rubber-to-glass connections are wired.

The whole apparatus is sterilized in a 6-ft long autoclave for 1 hr at 120° C.

After sterilization the apparatus is hung from the ceiling in an incubator room. Seed culture is introduced into the cellophane tube through the lower Y-tube bringing the saline. The culture medium is then introduced outside the cellophane by means of the lower side outlet.

Bacterial growth is initiated in the saline-dialysate mixture in 24–48 hr, whereas the outside medium remains clear and free from those metabolic products which cannot dialyze—e.g., tetanus toxin. Should the otherwise clear medium become cloudy, one suspects either contamination or a defect in the cellophane. (These can, however, be detected in advance by filling with water before setting up.)

Periodic replacement with fresh broth of the more