was present as the relatively volatile acid. Several laboratory experiments were run, filtering concentrations of acetic-acid or formic-acid vapor, readily detectable by odor, through Whatman No. 40 filter paper. In no case was acid recovered from the filter paper treated in the same manner as described previously. This was true even when carbonaceous smoke, made by incomplete combustion of benzene, was present in the mixture that was filtered.

It is possible that the acid radical found in the air samples was in the form of fine particles of one or more salts. Several acetates, including those of lead, calcium, sodium, copper, and magnesium, were prepared individually in solutions such that 0.1 ml contained 50 μg of acetate. Each of these preparations was evaporated to dryness and then taken up in ether saturated with ammonia, the latter solution being treated by the same chromatographic technique. In each case, nearly quantitative separation of acetate was achieved by spot-size comparison with a known standard solution. This indicates that any one of several acetate salts could have been present in the air samples and identified by the analytical procedure employed.

Since combustion seemed a possible source of the acid component detected in polluted air, the cooled gases from a number of combustion processes were sampled by filtration, either with Whatman No. 40 filter paper or with double-thickness extraction thimbles. The filters were dried at temperatures up to 100°C before analysis.

The gases thus sampled included engine exhaust of a relatively new automobile operating at idling speed (61 ft^3, showing only a trace of carbon); stack gas from an incinerator burning sawdust and a small amount of biological residues at a high temperature (10 ft^3, showing negligible free carbon and some finely divided fly ash); flue gas from a 75,000 Btu/hr natural-gas furnace (20 ft^3, showing no trace of carbon); and stack gas from a wood-burning fireplace (20 ft^3, showing appreciable carbon). From each of these combustion sources particulate acetates or formates were chromatographically separated in the following relative amounts: automotive exhaust, < 300 $\mu g/m^3$; incinerator, < 300 $\mu g/m^3$; gas fire, < 3000 $\mu g/m^3$; wood fire, > 3000 $\mu g/m^3$. There was no acid higher than acetic in any of the samples. Additionally, 18 ft^3 of natural gas contained no filterable acetate or formate. From each of these sources, except raw natural gas, a fluorescent, oily material was also extracted.

Because of the close approximation of the developed spots for formic and acetic acids, it cannot be said absolutely that all of the acidic material was one or the other. The spots found were at R_f 0.31 to 0.35. The data of Kennedy and Barker (*1*) show only acetic and formic acids at these low R_f values. Some additional data for the same type of analysis by Nair (*4*) indicate that a number of alkoxy acids are also at higher R_f values than 0.35. Thus, the substances filtered out of polluted air and determined by the procedure described are particulate one- or two-carbon acid radicals. Similar components are present in the effluent gas from combustion of several solid, liquid, or gaseous fuels. Additionally, it is probable that combustion in some cases is accompanied by synthesis of a small amount of the nonvolatile oil aerosol that was noted as fluorescent material on the chromatograms.

References and Notes

1. E. P. Kennedy and H. A. Barker, *Anal. Chem.* **23**, 1033 (1951).
2. On all sampling days, chosen because of visible haziness, the absolute and relative humidity was low, and the temperature was higher than ordinary. Records from two nearby stations show that wind velocities averaged less than 5 mi/hr except during the day of sample 6 when it was about 10 to 12 mi/hr.
3. J. D. Torrey has recently observed both lower fatty acid and fluorescent oil in a sample of filtered air from Denver, Colo.
4. J. H. Nair, *Anal. Chem.* **25**, 1912 (1953).

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Homogenizer for Continuous Homogenization

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In connection with the preparation of alkaline phosphatase from the microsome fraction of intestinal mucosa (*1*), it was desired to prepare homogenates in larger quantity than could be conveniently obtained with the conventional Potter-Elvejhem homogenizer. Consequently, a modification was made to permit a continuous passage of the material through the homogenizer.

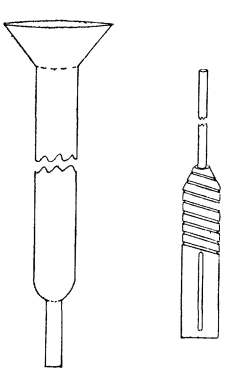

Fig. 1. Components of modified Potter-Elvejhem homogenizer.

The modified homogenizer is illustrated in Fig. 1. The barrel was constructed from a 25-mm Pyrex ignition tube, with a 10-cm length of 10-mm tubing sealed on one end to provide the outflow tube. The neck of a 250-ml Erlenmeyer flask was sealed to the other end of the ignition tube, and the bottom of the flask was removed to provide a reservoir for the material to be homogenized. The inside of the barrel was ground with a metal lapping tool and Alundum powder until the

walls were parallel as indicated by uniform stippling.

The pestle of the homogenizer was constructed of a 1-in Lucite rod 4 in. long, threaded at one end to receive a ¼-in. stainless-steel shaft. The shaft was of sufficient length to clear the reservoir by 2 in. with the pestle in position. The Lucite rod was turned down on the lathe to a diameter 0.001 in. less than that of the barrel. Eight turns of a four-to-the-inch left-hand thread were cut into the pestle, and four grooves 1/16 in. deep were cut longitudinally from the middle of the pestle to within ½ in. of the lower end. The threads and grooves were cut with a round-ended tool so that there would be no sharp angles into which the homogenate could pack. The top ¾ in. of the pestle was tapered outward from the stainless-steel shaft. Finally, the pestle was ground in with 220-mesh Alundum to give a loose fit (0.002 to 0.003 in. clearance).

In use, the barrel was held rigidly in a vertical position, and the shaft of the pestle was connected by a length of rubber pressure tubing to a suitable stirring motor. The tissue to be homogenized was minced and suspended in two volumes of the homogenizing medium. For intestinal mucosa, 5 sec in the Waring Blendor gave a suitable suspension. The suspension was then passed through the homogenizer at a rate of 600 ml in 30 min. In order to obtain adequate homogenization, two more passages through the homogenizer were required, after which microscopic examination indicated 70 to 90 percent disruption.

The homogenizer is obviously susceptible to considerable modification in size and detail, and could readily be jacketed for cooling. In addition to the work with mucosa, it has also been useful in preparing large volumes of liver homogenates (*2*).

References and Notes

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1. E. S. Harris *et al., Proc. Soc. Exptl. Biol. Med.* **81**, 593 (1952).
2. N. Krinsky and J. Ganguly, *J. Biol. Chem.* **202**, 227 (1953).

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New Stereotaxic Instrument for Use with the Rat

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Since the original development of a stereotaxic instrument by Horsley and Clarke, a number of different devices for placing lesions within the brain have been described for use with monkeys, cats, and rats (*1–5*). Nevertheless, many fundamental difficulties remain in their use, particularly with the rat. The present development provides an instrument for use with the rat (*6*) that would offer maximal stability, accuracy, and ease of operation.

The following are the major advantages of the instrument described here (Fig. 1). First, the 10- by 30-cm platform *A* to hold the animal is mounted on two racks to permit movement of the animal forward and back or left and right under the active electrode. This procedure eliminates the need for racks or slides above the head of the animal, and thus simplifies the construction of the electrode carrier; more important, it gives clear and unobstructed access to the operative field. By moving the platform, the animal can be placed anywhere under the active electrode over a range of 5.0 cm in the anterior-posterior direction and 4.0 cm in the left-right direction.

The second, and perhaps most noteworthy, advantage, is the construction of the electrode-carrier assembly. The entire carrier is mounted on a movable post *B* attached to the base of the apparatus 18 cm in front of the ear bars. This post can be swung aside so that the head of the animal is fully exposed to the operator. When coordinates are to be determined or the electrode is to be placed, the post can be swung back and locked into position, leaving the electrode zeroed over the head of the animal. The electrode itself can be adjusted in four ways: (i) the electrode carrier *C* can be moved vertically by a rack-and-gear arrangement over a range of 5.5 cm; (ii) it can also be adjusted over a 90° arc *D* in the anterior-posterior plane, giving any angular approach from 45° posterior to 45° anterior; (iii) this anterior-posterior arc, holding the electrode carrier, is in turn attached to a circular rack *E* that permits angular adjustments in the left-right plane, 50° each way; (iv) the post supporting the entire carrier assembly can be moved up and down on a screw *F* over a range of 3.5 cm, and thus allows a second vertical adjustment of the active electrode.

With these four adjustments, the active electrode can be brought directly to any target structure within the brain from any angle. The principle involved is simply to make the target the center of the hemisphere described by the anterior-posterior and left-right arcs. Then, whenever the electrode-carrier is returned to zero, the tip of the active electrode will always be on the computed target, regardless of whether the approach is from a simple or a compound angle or is perpendicular to the brain.

The procedure is simple. When the active electrode is at the correct anterior-posterior and left-right coordinates above the target, the post is elevated far enough on its screw to allow the electrode to be set at zero and still clear the animal. The post is then lowered on its screw until the tip of the electrode just makes electrical contact with the dry dura mater. To prepare for the penetration of the brain for a given distance in order to reach a particular target, the electrode is raised above zero in excess of that distance, and the post is lowered on its screw by exactly that distance. Then, no matter at what angle the electrode is placed, its tip will always reach exactly the same target within the brain when its carrier is returned to zero since the target is always zero, and zero is always the center of the sphere that can be described by all angular adjustments.