jute, linen and rayon, as well as 1,534,000 francs for investigations of the utilization of acrylic fibres.

A grant of 7,050,000 francs went to the Committee for the Study of the Solid State for continuation of work on the mechanism of photographic processes and of sensitization; 6,520,000 francs to the National Committee for the Study of Fruit Cultivation; 5,360,000 francs to the Committee for the Scientific and Technical Study of Milk and its Derivatives; 4,300,000 francs to the National Centre for Research on Herbage and Forage for botanical, phytosociological and ecological studies on herbage and on the control of adventitious plants of the prairies; 4,050,000 francs to the Centre for Scientific and Technical Research on the Conservation of Vegetables; and 3,817,000 francs to the Belgian Centre for the Study and Documentation of Water, for studies on water supply, corrosion, residual water, and on atmospheric corrosion.

The Belgian Institute of High Polymers received a grant of 3,710,000 francs towards its experimental thermodynamic work at high pressures on the inhibition of the explosiveness of acetylene; the Centre for Studies and Research in Agriculture, 3,590,000 francs for research on cultivation in mineral substrates and on the mineral requirements of vegetables; the Scientific and Technical Centre of the Brewing, Malt and Related Industries, 3,316,000 francs; and the Committee for the Study of the Structure of the Soil, 3,000,000 francs. Among other grants may be mentioned 2,770,000 francs for studies on diseases of cereals; 2,280,000 francs for ceramic research; 2,125,000 francs for research on the synthesis of saturated heterocyclic amines substituted in position 3 or 4; 2,065,000 francs for phytovirological research; 2,049,500 francs for research on paints, varnishes and printing inks; 2,040,000 francs for studies on the creep of metals at high temperatures; 2,000,000 francs for work on new penicillins and the new antibiotic, staphylomycin; and 1,840,000 francs for research on the culture of medicinal plants.

HELICOPTER STATIONS IN LONDON

IN July 1959, the Minister of Transport and Civil Aviation formed a committee to consider the setting up of helicopter stations in the London area, assuming: (1) that the helicopter is developed to the point of offering sufficiently low fares on regular services to attract large numbers of passengers for inter-city flights on international routes and possibly internal ones as well; (2) that the helicopter will not offer fares sufficiently low for mass travel, but will meet the needs of small numbers of travellers for whom the extra time saved is more important than the money spent.

In its recommendations*, the Committee assumes that regular services between London and the near Continental cities with helicopters carrying twenty-five passengers or more will begin in 1965, or soon after, that fares will be offered approximating those of first-class 'fixed-wing' services, and that services to provincial cities in the United Kingdom will follow if fares can be reduced to compete with those of the other forms of transport.

Allowing for executive and charter flights with passengers, freight and mail as well as regular services, the total traffic could amount to 20–25 helicopter movements in a peak hour, with a mixture of single- and multi-engined types by 1975, when the heliport would have to handle 1½ million passengers a year. These estimates, the committee suggests, represent a reasonable basis for planning the area required for the first permanent heliport.

In order to provide enough space for helicopters to land and take-off and for working stands (for loading, unloading, minor maintenance, etc.) at the heliport, a level area of about 8 acres would be required to handle 25 movements an hour. In addition, an area of about 4 acres would be needed for terminal buildings and car parks, which, if the landing area were on a raised platform, could be provided on a lower deck or at ground-level.

For reasons of air traffic control, the capacity of a heliport could not be increased much beyond 25 movements an hour even by providing an additional landing area, which would involve a disproportionate amount of extra space.

The heliport should satisfy the following requirements:

(1) Since the appeal of the helicopter depends on saving time, the heliport should be brought as close as possible to the main source and destination of a substantial proportion of the traffic. More specifically, it should not be much more than a quarter of an hour from Grosvenor Square, and ideally, between the West End and the City. Because of the helicopter's potentialities for freight and mail, nearness to one of the sorting offices of the General Post Office would also be an advantage.

(2) It should be conveniently placed for all forms of surface transport, good road connexions and local traffic access being especially important in view of the high proportion of passengers who will travel to the heliport in private cars and taxicabs.

(3) It should have sufficient unobstructed approaches to enable operations to continue safely in all weathers, allowing for a climb and descent gradient not much steeper than 1 in 4. This may entail some restriction on building heights in the neighbourhood of the site.

(4) To be usable at all by single-engined helicopters it should be beside the River Thames.

(5) In order to avoid conflict between helicopter and fixed-wing traffic to and from London Airport, it should not be located farther west than Battersea. For effective control of air traffic, it is unlikely that two sites on the Thames within easy reach of the West End could be simultaneously used to capacity.

(6) It should be compatible with the proposals of the County of London development plan.

(7) It should be so placed as to avoid interference with the normal life and work of the neighbourhood.

Measurements of the noise of the various types of helicopters indicate that noise in level flight at 1,000 ft. would be no greater than traffic noises in a busy street, but, since it will be more widespread, routes should be chosen which, so far as possible, reduce flights over areas particularly sensitive to noise. The greatest noise will be in the immediate locality of the

* Ministry of Aviation. Report of the Committee on the Planning of Helicopter Stations in the London Area. Pp. 105 (10 plans). (London: H.M.S.O., 1961.) 7s. net.

heliport, and within a radius of half a mile of it under the take-off and landing paths.

Provided the site is carefully chosen, that is, on the Thames and in an area where the activities are mainly industrial and commercial, the quieter types of turbine-driven helicopter, as well as existing piston-engined types, should be able to use it at moderate frequencies without causing a serious problem. Whether the same would apply to high-frequency or night operations remains to be seen. Furthermore, tests carried out in open country and over London suggest that interference with television and very-high-frequency broadcasting is unlikely to be serious.

A continued effort will be needed to clarify the effects of the noise of helicopters and means of abating it. Research into noise abatement at source is being carried out by Government establishments and manufacturers. Meanwhile, proposals for heliport development should be expedited on the basis that noise can and will be brought down to reasonable levels.

After a preliminary survey, nine sites near the River within reasonable range of the West End have been examined and the following locations are considered the most promising: Nine Elms; Cannon Street Station; St. Katherine Docks.

No attempt has been made to assess precisely the cost, since this is a matter for the promoters. The capital cost is likely to run into several millions of pounds, although it may vary considerably between one site and another. A single heliport of 12 acres should be capable of handling traffic well into the 1970's, but will not be able to handle all the traffic indefinitely if the helicopter becomes accepted as a means of mass travel. The question of a second heliport must be left for a decision until nearer the time when the requirement is seen to emerge.

THE RED DEER IN SWEDEN

FROM information furnished by Å. Sjöström, in a bulletin from the Royal School of Forestry in Stockholm, it appears that the red deer in Sweden is now reduced to some 150 animals confined to three relatively isolated localities in the southern province of Skåne*. The paper gives the results of a study conducted over an area of about 740 acres within the Sövdeborg locality, which extends to some 4,300 acres and contains a herd of 30 deer. The annual hunting licence allowed the shooting of 5 animals but might be extended to equal the annual increase, which is 8. The area studied contains some 376 acres of Norway spruce plantations and 179 acres of beech forest, to which the deer do a considerable amount of damage, said to be due to a deficiency of certain nutrient elements in their diet. A careful assessment is made of the damage, which is caused mainly to trees from 15 to 45 years old, and leads to the conclusion that the cost of producing one red deer is 4,000 kr. (£280). In a Danish deer-forest of some 7,200 acres with a head of 60–100 animals, Prof. Grøn has estimated that the cost of production of one animal is about 6,700 kr. (£465). Among the suggestions for dealing with these remnants of Sweden's original fauna are fencing of plantations—regarded as too expensive; change of tree-species—thought to be a possible solution; use of chemical repellents—regarded as of doubtful and uncertain efficiency and too expensive; heavier shooting—inapplicable in view of the already small number of animals; formation of red deer reserves and, finally, transfer to more suitable localities in natural spruce forests in west and central Sweden. One such transfer has already started. The interesting proposal is made that a charge of 10 kr. (14*s*.) per head on every roe deer, for which a shooting licence is required, should be levied. This would bring in about 300,000 kr. (£20,800) a year, which would be used to purchase and maintain an area of suitable land where a new and vigorous stock of the Swedish red deer could be built up.

* Kungl. Skogshögskolans Skrifter. (Bulletin of the Royal School of Forestry, Stockholm.) Nr. 35: *Kronhjortens Skadegörelse på Granskog: Examensarbete vid Skogshögskolan i amnet Skogszoologi med Viltvård Utfört ar* 1959. Av Åke Sjöström. Pp. 36. (Stockholm: Skogsbiblioteket, Skogshögskolan, 1961.) 5 kr.

O'NYONG-NYONG FEVER: AN EPIDEMIC OF VIRUS DISEASE IN EAST AFRICA

EARLY in 1959 an outbreak of unfamiliar disease appeared in human populations in the north-west corner of Uganda, and spread across the northern half of the country in a south-easterly direction. The disease was usually characterized by headache, fever, adenitis and crippling joint pains, frequently followed on about the fourth day by an eruption of an itching rash, mainly on the trunk and arms. These symptoms usually persisted for 5–7 days and were generally followed by quick and complete recovery.

The clinical, and some of the epidemiological, aspects of the disease were investigated by Dr. H. Shore, the acting provincial medical officer in the Northern Province of Uganda, who reported that a dengue-like disease was affecting "vast numbers of people, old, young, men, women and children", and provisionally estimated from the rate of attack that at least 25–50 per cent of the population was at risk. That all ages were affected led him to suspect a causative agent new to the region. This view is supported by the fact that the local African population have coined a new name for the disease in each successive language group in which it has appeared, one of the first of these being 'o'nyong-nyong'.

The epidemic advanced steadily on about a 100-mile front for ten months, crossing the Uganda–Kenya border some 300 miles south-east of the original site of the disease in Uganda, in November, 1959. Between December 1959 and February 1960, the epidemic fanned out in the Kano Plains near Kisumu, Kenya. It is still active at discontinuous points east, south and west of Lake Victoria. From June, the epidemic has been under detailed study by members of the East African Virus Research Institute Staff, in close collaboration with members of the Uganda, Kenya and Tanganyika Medical Departments.

In a report*, prepared by J. D. Gillet, M. C. Williams, J. P. Woodall, P. S. Corbet and J. M. Ellice, it is shown that the isolation of o'nyong-nyong

* East Africa High Commission. East African Virus Research Institute Report, July 1959–June 1960. Pp. i + 57. (Entebbe: East African Virus Research Institute, 1960.)