fibres in the ulnar nerve from patients with Werd- 
ning-Hoffmann disease but no evidence of demyelina-
tion with teased fibre preparations. They suggest-
ed that the slow motor nerve conduction may be 
due to arrested myelination brought about by the 
fetal onset of the disease.

The finding of slow conduction in the severe but 
not in the other forms of spinal muscular atrophy 
suggests that the severe infantile form of spinal 
muscular atrophy as a group are different from the 
other forms of the disease and this might support 
the views of those workers who believe that different 
genes are involved (Hausmanowa-Petrusewicz, 
1970; Fried and Emery, 1971; Pearn, Carter, and 
Wilson, 1973). However, the difference may be 
explained by the early onset in the severe form with 
secondary effect on myelination.

The presence of slow motor nerve conduction in 
Werdnig-Hoffmann disease makes it difficult to 
distinguish it from severe peripheral neuropathy 
(Karch and Urich, 1975). Recording of sensory 
action potential may not help either as it has been 
reported as being absent in Werdnig-Hoffmann 
disease (Raimbault and Laget, 1972), though our 
own preliminary studies have failed to confirm this 
(Schwartz and Moosa, 1976). Difficulties of inter-
pretation may also be encountered in the muscle 
histology, especially in the very early stages of the 
disease. The EMG appears to be the only sure 
way of diagnosis with the finding of the character-
istic repetitive discharges described by Buchthal and 
Olsen (1970). These have not been described in 
other neurogenic conditions.

Summary

The ulnar and posterior tibial conduction veloc-
ties were measured in 29 children with spinal 
muscular atrophy, 14 of whom had the severe form 
of the disease. The ulnar nerve velocity was slow 
in 12 of the 14 severely affected infants, but normal 
or fast in 11 of 14 children less severely affected. 
The corresponding results for the posterior tibial 
nerve were slow velocities in 11 of 12 infants in the 
severe group and normal or fast in all 11 infants 
less severely affected. The difficulty in distin-
guishing infantile spinal muscular atrophy from 
peripheral neuropathy is emphasized.

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Dystrophy Group of Great Britain and the Medical 
Research Council.

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Failure to thrive and death in early infancy associated with raised 
urinary homovanillic and 
vanillylmandelic acids

'It is not always possible to find why certain 
infants fail to thrive. Such instances are regarded 
as due to some congenital weakness of constitution, 
a concept which is still far from satisfactory' (Holt and McIntosh, 1933). An enigmatic case of 
failure to thrive in an infant is here reported.

Case report

A 2J-month-old White boy was brought to the Mayo 
Clinic for evaluation of failure to thrive. The infant 
was born at term to a 35-year-old White woman (gravida 
IV, para 3) whose other 3 children are alive and well. 
Pregnancy was complicated by polyhydramnios, noted 
after the fourth month of gestation. Also, at the seventh
month of pregnancy the mother had an episode of pneumonia that resolved with erythromycin. Labour and delivery were uncomplicated. Birthweight was 2700 g, head circumference 35 cm. The baby was fed with standard formula (Enfamil, 60–90 ml every 3 hours).

At 1 month, however, there was no weight gain, and the formula was switched to a soya protein isolate preparation (Isomil). The infant vomited about once every 2 days and seemed to have constant nasal congestion and some mucoid discharge from the nose.

When examined at the Mayo Clinic at the age of 2½ months (Fig.) he was found to be a 2600 g, emaciated infant with a length of 48.3 cm and head circumference of 36.7 cm (all below the 3rd centile). Blood pressure by flush method was 75 mmHg. A white mucoid discharge from the nose and a 2/6 systolic ejection murmur were noted. The liver and spleen were palpated 2 cm below the costal margin. A smooth kidney was palpable in the left flank and a 2 × 2 cm angioma of the left thigh was noticed. The infant had opisthotonic posturing on occasion.

Hb was 11.3 g/dl, haematocrit 30.7%, platelets 352 000/mm³ (352 × 10⁹/l), leucocytes 5900/mm³ (5.9 × 10⁹/l) with 34% neutrophils, 48% lymphocytes, 13.5% monocytes, and 4.5% eosinophils. Urine was microscopically clear, s.g. 1.012, and pH 7. Arterial blood gases were normal, pH 7.42. Creatinine was 0.45 mg/100 ml (40 μmol/l). Serum Na, K, Ca, and Mg and glucose were normal. SGOT 26 units/l, and SGPT 20 units/l. Serology for the following was negative: Toxoplasma, rubella, cytomegalovirus, herpesvirus, and syphilis. A tuberculin skin test was negative. Serum thyroxine 11·4 μg/100 ml (898 nmol/l); stool fats (72-hour collection) within normal limits. Sweat Na, immunoglobulins, and serum proteins were normal, as was chromosome analysis (46, XY).

Viral and bacterial cultures of the nasopharynx, urine, stool, and CSF were noncontributory. Serum and urinary amino acid, and serum ammonia values were normal. X-rays of the skull, chest, and skeletal system and an intravenous pyelogram were normal. EMI scan (computerized transaxial tomogram) of the head showed no evidence of a space-occupying lesion or cerebral atrophy. EEG was normal. Histamine skin test, normal. Bone marrow aspiration showed no abnormal cells.

**Hospital course.** Several modifications of diet using medium-chain triglycerides and gavage feeding, although providing adequate caloric intake, failed to produce weight gain or change in head size during 8 weeks’ observation.

The infant had a pulse rate of 120–150 throughout his hospital stay. On one occasion opsonolus was seen; we therefore measured urinary homovanillic acid (HVA) and vanillylmandelic acid (VMA) (Table).

He had never been fed banana or vanilla products. Because we suspected the presence of an occult neuroblastoma, we did an abdominal laparotomy. Despite careful exploration of the abdominal cavity, we found no tumour.

His hospital stay was complicated by right upper lobe pneumonia that resolved when antibiotics were administered. He was sent home and died there at the age of 4½ months (weight 2460 g). Complete necropsy

![FIG.—Facial appearance, showing abnormal vertical eye movements.](http://adc.bmj.com/)

**TABLE**

<table>
<thead>
<tr>
<th>Specimen</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>HVA</td>
<td>24.4</td>
<td>26.5</td>
<td>31</td>
<td>23.8</td>
<td>23.3</td>
<td>14–15</td>
</tr>
<tr>
<td>VMA</td>
<td>65</td>
<td>44.3</td>
<td>45</td>
<td>34.3</td>
<td>43.8</td>
<td>12–35</td>
</tr>
</tbody>
</table>
did not show any tumour in the abdomen, chest, neck, adrenal glands, or central nervous system. On microscopic examination, the brain, lung, thyroid, liver, adrenal glands, and intestinal tract were normal. Post-mortem blood culture yielded pneumococci.

**Discussion**

The investigation of failure to thrive in infancy includes a search for organic, environmental, and emotional causes (Illingworth, 1963; Luzzatti, 1964). Hannaway (1970) studied 100 infants with 'failure to thrive': 51% were found to have non-organic causes such as feeding problems, environmental deprivation, constitutional dwarfism, and rumination; 49% proved to have organic causes, urinary tract infection and central nervous system, gastrointestinal, cardiovascular, endocrine diseases, and in the case of one patient familial dysautonomia.

Our patient had severe growth retardation with no identifiable cause. On five occasions urinary HVA and VMA were raised. The urinary values of catecholamine metabolites of healthy children are well established (Voorhess, 1967; Gitlow et al., 1968; Hakulinen, 1971). Transient increased urinary catecholamine metabolite excretions have been observed in children in four conditions (Hakulinen, 1971): after surgical procedures; congenital heart disease with heart failure; acute bronchial asthma; and after exchange transfusion. The finding of persistently raised catecholamine metabolites in our patient prompted us to look for a neural crest tumour. However, the clinical, surgical, and necropsy findings did not disclose such a neoplasm in situ.

Familial dysautonomia is the only non-neoplastic disorder in which peripheral catecholamine metabolism is disturbed, the urinary VMA value is less than normal, and the HVA concentration is raised (Gitlow et al., 1965; Moskowitz and Wurtman, 1975). In our patient this possibility was ruled out by the normal histamine skin test.

Our patient had either increased synthesis or excessive destruction of catecholamines, but the relation of this to the biochemical abnormality and the failure to thrive is unclear. We are unaware of a comparable case. Should a similar case be encountered, detailed balance studies would be of interest.

**Summary**

A case of failure to thrive in an infant with persistently raised urinary levels of homovanillic and vanillylmandelic acids is described. No neural crest tumour was discovered at surgical exploration or at necropsy. The relation of this biochemical abnormality and failure to thrive is unclear.

**Short reports**

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**Childhood actinomycosis**

**Report of 3 recent cases**

The diagnosis of actinomycosis in 3 children presenting during an 18-month period at one hospital is uncommon, and raises the possibility that the reported incidence (*British Medical Journal*, 1973) of this disease in childhood does not reflect its true occurrence. These cases were diagnosed by prompt microscopy of fresh pus followed by anaerobic and aerobic cultures. The causative organism was described a century ago by Israel, and its frequent appearance with other organisms, as occurred in Cases 1 and 2, was reported by Glahn (1954).

*Actinomyces israelii* is classified in an intermediate position between the bacteria and fungi, and is included in the order actinomycetales with the mycobacteria, *Nocardia* and *Streptomycetes*. It is commonly found as a commensal in the mouth and pharynx and its pathogenicity is probably related to dental caries and the coexistence of anaerobic streptococci. It spreads by direct invasion into tissues but not via lymphatic vessels. Blood-borne infection has been described.
Failure to thrive and death in early infancy associated with raised urinary homovanillic and vanillylmandelic acids.

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