is required in the form of cod liver oil, whilst with infants the opposite effect has been found, calciferol having greater activity than an equal number of rat units in the fish liver oil. However, all evidence of variation in potency between the two substances has been based on responses of different species, and insufficient attention may have been paid to effects caused by the unequal adsorption and utilization of the vitamin, as well as to the possibility of secondary rachitic influences of other major constituents of the diet. Thus the vitamin A in the fish oil might have a powerful effect in the assimilation of vitamin D and might also account for the finding by Ender that the chemical and physical properties of the two active substances differ slightly.

Other substances with antirachitic activity to a lesser degree are 22:23-dihydroergosterol after heating and 7:8 dehydrocholesterol after irradiation.

Vitamin D is the one case so far established where hypervitaminosis is a real danger, when overcalcification of bone and the calcification of soft tissue result.

Reproductive Vitamins—

It now appears that more than one vitamin is essential for the efficient functioning of the reproductive processes.

(a) Vitamin E—

Evans, Emerson and Emerson (1936), by fractional distillation of wheat-germ oil have succeeded in isolating a pale yellow oil with very high activity in enabling vitamin E-deficient rats to bear young, to which they ascribe the formula C_{29}H_{50}O_{2}. The substance which has proved to be an alcohol and has been renamed α-Tocopherol is also suspected of being related to the sterols.

The reports that pregnant women with a previous history of abortion for no apparent cause have been successfully treated enabling them to complete gestation in over 80 per cent of cases indicate the probable importance of the vitamin therapeutically. The extract, however, has been found to have no effect in the treatment of sterility. (Watson and Tew 1936).

(b) Vitamin F—

Evans, Lepkovsky and Murphy (1934) report the existence of essential fatty acids, to which is given the designation vitamin F. In the absence of this factor a failure in the reproductive function always results. It is marked by a peculiar and characteristic prolongation of the gestation period, due, apparently, to a derangement of the birth mechanism. The addition of vitamin F (contained in lard and butter) to the diet enables the young to thrive normally, but lactation is still not normal.

REFERENCES.

Birch and Harris (1934). Ibid. 28, 602.
Birch, Harris and Ray (1933). Ibid. 27, 590.

AN INVESTIGATION INTO THE INCIDENCE OF HIGH BLOOD PRESSURE IN THE NATIVE.

A. BROOMBERG.

In the European under the age of 40 years, the normal blood pressure is generally recognised to be in the neighbourhood of 120 to 130mm. Hg., systolic, and 80 to 90 mm. Hg., diastolic; the extremes of the normal range of the systolic pressure appearing to be 110 and 140 mm., respectively. Over this age a gradual elevation of these figures is found, and with the advance of years and the onset of arterio-sclerotic changes in the vascular system, pressures of 150 to 200 mm. are commonly observed, occasionally without any associated abnormal symptoms being present.
As a rule, however, the constant presence of a systolic pressure above 140 mm., at any age, can always be regarded as abnormal and in fact in most cases it is one of the factors in the composition of a pathological syndrome. The seriousness of such an elevated blood pressure in men and women over the so-called "dangerous age" lies not only in the various symptoms which are present, but mainly in the fact that in civilised communities it has become alarmingly prevalent, and with all its concomitant discomforts apart from its positive dangers to life it is fast becoming the bane of middle life.

The query thus arises whether high blood pressure is an inevitable accompaniment of civilized living conditions, and whether it is equally prevalent in uncivilised or sub-civilised communities such as are found in South Africa among the Bantu peoples. In an attempt to elucidate this question a series of observations was made over a period of two years, the subjects being 230 apparently normal Zulu adults encountered in the course of general practice in Durban. These subjects proved to be particularly suitable as none of them suffered from any serious disease, the majority of the women being pregnant or desirous of becoming so, and the majority of the men suffering from various abdominal complaints, usually constipation. A small percentage of both sexes were victims of venereal diseases in various degrees of chronicity. None of the patients suffered from any obvious cardiac or renal disease, although in three cases where a particularly high blood pressure was recorded, laboratory tests would probably have revealed some renal insufficiency.

In this investigation the results obtained proved very illuminating, although the deductions to be drawn from them could not be regarded as conclusive on account of the relatively small number of subjects examined.

Of the 250 individuals observed, 115 were females, and in this class the following readings were obtained:—

In 60 women whose ages ranged from 16 to 40 years—27 of the subjects being over 30 years of age and the remainder in their early twenties—the average blood pressure was found to be 122 mm. Hg., Systolic, and 80 mm., Diastolic. 16 of the older women, i.e., those between 35 and 40 as near as one could gauge, recorded a pressure of 125 to 130 (systolic) and 7 of the women in their twenties possessed a blood pressure ranging from 110 to 120 mm. Hg. (systolic).

55 women whose ages ranged from 40 to 75 years—30 of these females were still menstruating regularly, and were under the age of 50; 18 had passed their climacteric and were between 50 and 65 years of age; and the remainder 7, were 65 years and onwards, the oldest being about 75.

The readings obtained were as follows:—

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No.</th>
<th>Average B.P.</th>
<th>Highest</th>
<th>Lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>16—20</td>
<td>60</td>
<td>122</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>25—30</td>
<td>16</td>
<td>126</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>35—40</td>
<td>30</td>
<td>134</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>45—50</td>
<td>18</td>
<td>140</td>
<td>98</td>
<td>100</td>
</tr>
<tr>
<td>50—60</td>
<td>7</td>
<td>143</td>
<td>100</td>
<td>150</td>
</tr>
</tbody>
</table>

Tabulating the series then, in 115 women we obtain the following:—

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>No.</th>
<th>Mean B.P. (systolic)</th>
<th>Mean B.P. (diastolic)</th>
<th>Highest</th>
<th>Lowest</th>
</tr>
</thead>
<tbody>
<tr>
<td>16—20</td>
<td>60</td>
<td>122</td>
<td>80</td>
<td>130</td>
<td>110</td>
</tr>
<tr>
<td>25—30</td>
<td>16</td>
<td>126</td>
<td>80</td>
<td>130</td>
<td>125</td>
</tr>
<tr>
<td>35—40</td>
<td>30</td>
<td>134</td>
<td>90</td>
<td>138</td>
<td>126</td>
</tr>
<tr>
<td>45—50</td>
<td>18</td>
<td>140</td>
<td>98</td>
<td>155</td>
<td>135</td>
</tr>
<tr>
<td>50—60</td>
<td>7</td>
<td>143</td>
<td>100</td>
<td>154</td>
<td>138</td>
</tr>
</tbody>
</table>

It will be noticed that the highest readings obtained for all ages were 155 in a woman of about 60 years, and 154 in another whose age must have been approximately 70. In these two cases and in a third where a pressure of 150 was found in a woman over 50, the general clinical appearances were highly suggestive of renal disease, and laboratory tests would almost certainly have proved the presence of some degree of insufficiency. In all three cases albuminuria was present.

An important feature of this investigation, which will be referred to again, was the fact that about 95% of all the female subjects examined were kraal dwellers engaged in tending the fields, in various agricultural pursuits, or else in attending to the ordinary needs of domestic life, such as rearing children, preparing food, gathering fuel, etc. The remaining 5% were domestic servants in the city, school teachers, married women whose husbands were in employment in Durban, but were not themselves employed in any form of manual labour.

Among the 135 native males examined were included 70 who were engaged in various occupations in town, such as domestic service, general labourers, mechanics, stevedores, messenger and delivery boys, etc., and 65 who
were kraal dwellers, and engaged in agriculture and other work associated with farming operations.

The results obtained can again be tabulated as before:

**Town Dwellers (70)**

<table>
<thead>
<tr>
<th>Age</th>
<th>No.</th>
<th>Mean systolic B.P. in mm. Hg.</th>
<th>Mean diastolic B.P. in mm. Hg.</th>
<th>High-est Reading</th>
<th>Low-est reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>17—35</td>
<td>30</td>
<td>120</td>
<td>80</td>
<td>123</td>
<td>114</td>
</tr>
<tr>
<td>35—45</td>
<td>20</td>
<td>129</td>
<td>84</td>
<td>135</td>
<td>120</td>
</tr>
<tr>
<td>45—70</td>
<td>20</td>
<td>138</td>
<td>90</td>
<td>144</td>
<td>122</td>
</tr>
</tbody>
</table>

**Kraal Dwellers (65)**

<table>
<thead>
<tr>
<th>Age</th>
<th>No.</th>
<th>Mean systolic B.P. in mm. Hg.</th>
<th>Mean diastolic B.P. in mm. Hg.</th>
<th>High-est Reading</th>
<th>Low-est reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>17—35</td>
<td>24</td>
<td>120</td>
<td>78</td>
<td>122</td>
<td>116</td>
</tr>
<tr>
<td>35—45</td>
<td>25</td>
<td>128</td>
<td>80</td>
<td>136</td>
<td>120</td>
</tr>
<tr>
<td>Over 45</td>
<td>16</td>
<td>136</td>
<td>88</td>
<td>140</td>
<td>130</td>
</tr>
</tbody>
</table>

Although as before mentioned the number of cases investigated cannot be considered large enough to warrant any dogmatic conclusions being drawn, the data obtained does reveal some significant facts. In the first place it will be noticed that the general tendency is towards relatively low pressures at ages over 35—the highest reading obtained was in a town native of 65 years, i.e., 144 mm., and a figure of 140 was found in a kraal dweller of 50 years, and in 6 others whose ages ranged from 55 to 65. When the tables for both sexes are analysed this tendency is seen to be clearly demonstrated, although it seemed to be less marked in the female figure; of all the 250 readings taken a pressure above 140 mm. was found in only 4 cases, i.e., 1.6%, and in only 15 cases was there a pressure of 140 mm. (the normal limit) i.e., 6%. The rest of these readings all fall well within the normal range as observed in Europeans. A second noticeable feature is the fact that when the average blood pressures of town dwelling natives are compared with those of their compatriots living under the very primitive conditions prevailing in the kraal, there is found, at all ages a slight, but definite tendency towards lower readings in the latter and, particularly so in the middle-aged series; and thirdly it will be perceived that the pulse pressure in all cases maintains a steady level of 40 to 48 mm. Hg., agreeing in this respect with the ordinary findings in healthy Europeans. In no case was the diastolic pressure unduly elevated.

Considering these observations from the clinical viewpoint, one may tentatively conclude that arterial hypertrophy and hyperpiesia are uncommon, or relatively uncommon, in the Zulu; and perhaps this may be explained on etiological grounds. Price states that arterial hypertrophy is the result of the circulation of poisons, which act as pressor substances and cause persistent contraction of the heart and arteries. These poisons he enumerates as follows:

1. Resulting from depletion due to over-eating and lack of exercise, in which case they are absorbed from the bowel.
2. Arising from focal sepsis, e.g. teeth, tonsils, genito-urinary tract, and nasal sinuses.
3. Endocrine disturbances, e.g. at the female menopause, in cases of thyroid deficiency and adrenal hypersecretion.
4. Poisons introduced from without such as excessive smoking, alcoholism, drug addictions, lead poisoning and other forms of industrial intoxications.
5. Prolonged mental strain and anxiety which are inseparably connected with modern life and conditions. It has been shown that acute mental strain and fear result in oversecretion of adrenaline.
6. Pressor substances found circulating in the blood in renal disease, where the kidneys fail to perform their function of removing these toxins from the blood.

Although all these factors are of importance, the outstanding causes and also the commonest and most widely prevalent are, in my opinion, those concerned with

a. Overeating.
b. Under exercise.
c. Chronic constipation.
d. Chronic intoxication by tobacco, alcohol, etc.
e. Worry, mental stress and strain.

That hyperpiesia is claiming an increasingly large number of victims in civilised communities is now a well established fact. Nor is this alarming increase to be marvelled at, when it is realised how utterly unnatural and artificial are the rushed, worried and hectically feverished lives which modern social conditions demand from those who would wish to enjoy even the very barest degree of comfort, if only the acquisition of sufficient food to keep themselves alive. And with each advance in the social scale the accompanying pyrexia increases until, long before the alloted span of three score and ten years, men and women become prematurely aged, find their
blood pressure to have become stationed at abnormally high levels, and while still in the prime of their lives and, potentially at the height of their communal usefulness, discover that their efficiency has been reduced to the level where output is no longer commensurate with the work and effort required. In other words most individuals over the age of 45 no longer function economically; the overheads have become far too heavy and the reserves too small.

In semi-or un-civilized communities however, conditions of life, although more hazardous from the point of view of physical dangers, are nevertheless not nearly so conducive to the development of the hyperpiesic syndrome, and to demonstrate this opinion the Zulu in Natal may be chosen as a fitting example of an easily accessible uncivilized type of society.

For the purposes of comparison let us consider the various predisposing and etiological factors which have already been enumerated. The dietary habits of the average European are well known to be slipshod, irrational, and generally speaking, unbalanced. Meat forms the bulk of his food and although various observers like Don and Thomas claim that they have been unable to prove any relationship between excessive protein intake and high blood pressure, yet other authorities are inclined to the view that prolonged and excessive consumption of meat and other proteins does predispose to early arteriosclerotic changes. In addition to this, meals are hurried, food improperly and too rapidly chewed and consequent dyspepsia encouraged. Tinned and artificial foodstuffs are eaten in enormous quantities; vegetables are badly prepared, wrongly cooked and are present in the daily diet only on tolerance. In any event fruit and vegetables do not form nearly as important a part, quantitatively or qualitatively, as meats and allied foods do, in the ordinary individual's daily menu. And in addition the actual amount of food consumed is far and above that required for good health, perfect digestion, and maximum mechanical efficiency. Chronic constipation with its attendant evils enters the picture at an early age, and combined with the universal over-indulgence in alcohol and tobacco which is so characteristic of civilized society, ample opportunity is provided for endo- and exo-toxins to undermine the integrity of the vascular system and thus to initiate the condition of high blood pressure. In this way is born the composite, the hurried, worried, flurried, constipated, overweighted and under-exercised modern business man, the chronic "hyperpiesic."

In the kraal native, on the other hand, a totally different state of affairs is found. Instinctively, or perhaps as a result of economic necessity, he has adopted a life of the utmost simplicity. His diet consists in the main of maize and corn, sweet potatoes, beans and madumbis. On relatively rare occasions he has meat on his "table," probably not more than once or twice a month, but when he is able to indulge he does so in royal fashion for he is very fond of a change. One meal a day is the rule. At other times he drinks varying amounts of liquids such as milk, sweet or preferably semi-sour "maas," water in large quantities, and a fermented drink made of mealie meal or kaffir corn. Early to bed and early to rise is his golden rule; a traveller in Zululand will invariably find the family in bed soon after sunset, but he will always find them up and about at sunrise. Clothing is very primitive in style, highly coloured, profusely decorated with beadwork, but sufficient to protect the body from the heat of the sun in the summer and the cold in the winter. At all times of the year, however, the chest is almost fully exposed. Children run about naked in all weathers and at all ages. Most significant is the careful attention which is paid to the hygiene of the mouth and the regular action of the bowels. After every meal (?) no matter how small, the teeth are carefully cleaned with water and ashes—the native cannot afford to allow his teeth to decay—and the result is to be seen in the truly wonderful sets of teeth with which the kraal natives are or seem to be endowed. As for the bowels, constipation is dreaded so much that two or three motions daily is considered to be the ideal. To achieve this highly desirable end it is customary to drink infusions of various herbs or else to administer an enema at regular intervals. The latter procedure is carried by inserting a horn into the anus funnelwise and pouring water or a herbal infusion into the rectum. Attention to the bowels thus occupies a most important place in the hygienic scheme, and serves the useful purpose of protecting the native from disease as far as this precaution can do so. Chronic
constipation is therefore unknown to the native who is born and bred on the kraal.

Exercise is plentiful for the work though unremunerative is hard and occupies all the Zulu's daylight hours. Having no easily available means of transport and not being able to afford the luxury of owning a motor car or other vehicle, he walks, and when he decides to walk distance is no deterrent.

The mental strain and worry which are such destructive forces in the civilized individual are conspicuously absent from the native's mental outlook. Whether he needs to worry or not, he apparently never does so, for his philosophy is fatalistic and his life is lived in the present. As far as he is concerned the future can look after itself. He is inclined to be happy-go-lucky and quite irresponsible being concerned chiefly with his day's work, the provision of food and a hut for his family, and the observance of his tribal customs in respect to marriage and so on. Affairs of state and high finance are not of any immediate interest to him; his life and mode of living is simple, healthy and, to him, full of joy.

That is the kraal dweller. But what happens to his colleague who drifts to the towns. He immediately encounters a vastly different atmosphere, different conditions, difficult situations. He comes into contact with the worst evils of civilized life, falls a prey to them, is absorbed by them and because his primitive mind is unable to grasp the significance of it all, he very soon loses control. His mode of life becomes a compromise between the kraal and the city and a tendency develops for him to acquire the diseases of civilization. Hence middle age for him also becomes more precarious than that of his country brother but never as frequently nor as markedly as in his European neighbour.

Thus briefly summarising the foregoing discussion we may conclude that:

1. The blood pressure in the native under the age of 35 falls well within normal limits.
2. Above this age there is a marked tendency towards low levels, as compared with the findings in a corresponding series of Europeans.
3. Hyperpiesia of an essential type is uncommon.
4. The influence of etiological factors explains the notable difference between the prevalence of high blood pressure in the middle aged native and that of the European, and also between that of the kraal dweller and of his civilized brother in the city.
5. Arteriosclerotic changes are likewise found to be comparatively uncommon. Here again the etiology is important.

THE RELATION OF ERGOTAMINE AND THE OESTROGENIC PRINCIPLE TO PERIPHERAL GANGRENE.

C. C. FREED and J. J. PRAG.

Ergot is derived from a fungus (Claviceps purpurea) which grows on rye and certain grasses and it is a variable mixture of various potent and relatively inert substances. The main active constituents are the alkaloid ergotoxine and ergotamine and the amines histamine and tyramine. According to Rothlin, the alkaloid ergotamine is the most important constituent of ergot, the one the presence of which in ergot preparations should be ensured. This alkaloid ergotamine (C_{23}H_{29}O_{5}N_{16}) is now extensively used mainly as the tartrate, for the prevention and control of postpartum haemorrhage from atonic uteri and the treatment of retained lochia, delayed involution, bleeding following caesarean section and haemorrhage from abortion. Recently authors have advocated its use for various other conditions among which are migraine, exophthalmic goitre, pulmonary haemorrhage, pruritis, diabetes mellitus, diabetes insipidus, melancholia, prolapse of the rectum and glaucoma.

As is well known there are two forms of ergotism, the gangrenous and the convulsive. The convulsive form does not produce such highly characteristic effects as the gangrenous. It is with the gangrenous form, however, which we are concerned with here. Dale in 1906 was among the first workers in this direction and he concluded from his experiments on animals that: (1) The physiological effect of ergot preparations fall into two groups (a) Stimulant effects on plain muscular organs, prominent among which are contraction of the arteries, the uterus and the sphincter of the iris. (b) A specific paralysis of the motor elements in the structures, associated with sympathetic innervation, which