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CONTENTS

NAWAB MUHAMMAD ALI WALAJAH'S PETITION TO THE COURT OF DIRECTORS OF THE EAST INDIA COMPANY

BY

DR. YUSUF HUSAIN KHAN, D.LITT. (PARIS)

(Reader in History, Osmania University)

THERE is a series of documents in the Saidiya Library of Hyderabad (Dn.) which throws some light on the affairs of the Nawab Walajah of Carnatic with regard to his debts and his dealings with the East India Company. The documents are known as 'Maswaddai Haqiqat' or 'Draft containing the Truth of the Matter'. In these papers the Nawab has put forward the vindication of his claims vis-à-vis the Company and has disproved the alleged claims of the Company and his other private creditors.

Nawab Muhammad Ali Walajah kept a splendid court in the suburbs of Madras. His wasteful and extravagant mode of life plunged him deep in debts to meet his current expenses; he was perennially in need of money. He contracted huge loans with the Government of Fort St. George as well as with private creditors who were mostly the English servants of the Company. The money was advanced at 36 to 48 per cent. interest. Before taking the loans he used to give a 'Nazar' or 'presents'; and in case he could not give the 'Nazar' he paid interest for that also which was called 'Sud-i-Nazar'. The creditors received assignments of land revenue of the Nawab's territory to recover their debts. The Nawab mortgaged certain parts of his Dominions and granted to the East India Company the territory immediately surrounding Madras. The creditors generally bled white the poor and helpless inhabitants of the country and divided the spoils among themselves. The moral atmosphere at that time seems to have been as pestilential at Fort St. George as at Fort William. In Bengal the servants of the Company exploited the change of administration to their personal profit, by trading free of taxation, while in the Carnatic they sought advantage by lending money at huge rates of interest to the Nawab of Arcot and other landed gentry. In course of time these debts had become regular speculative investments which the company recognised as valid and assisted in their collection.

A servant of the Company named, Paul Benfield was the notorious organiser of speculative investment in debts in which some of the influential members of Parliament were also interested. He claimed a huge sum of money from the Nawab and petitioned the Madras Council to assist him to recover the same. Paul Benfield had acquired a corrupt influence in the English politics of the day. He was caricatured as 'Count Rupee' with a black face going about in Hyde Park riding on a stout cob.[1] Critics of Government drew the attention of the Parliament towards the scandalous dealings of the servants of the Company with the Nawab of Arcot. Burke made this affair the subject of his famous speech in which he exposed the evils of the system of administration which gave scope to corrupt elements of the Company to exploit the people of the country to their utter ruin.

During the Governorship of Mr. Wynch, Tanjore was subjugated and annexed to the territory of the Nawab of Arcot. The Court of Directors condemned the deposition of the Raja and recalled the Governor who was held responsible for the

[1] *Cambridge History of India*, vol. iv, p. 355.

transaction. His successor, Lord Pigot, was given instruction to reinstate the Raja. Lord Pigot announced the restoration of the Raja in spite of the appeals of the Nawab. At this time Paul Benfield intimated to the authorities at Madras that he held assignments on the revenues of Tanjore for the loans advanced by him to the Nawab. He hoped to profit by the recognition of Nawab's authority to the territory of Tanjore. Benfield manipulated things so as to get the Commander-in-Chief and the members of Madras Council to support the Nawab. The bitter opposition between Lord Pigot and the members of his Council resulted in the former's arrest and imprisonment in which condition he soon after died. When this anarchy held sway in Madras, the supreme Government of Fort William remained inactive.

When the Court of Directors was apprised of the state of affairs at Madras, the subject was brought forward in the General Court where it was moved 'that it be recommended to the Court of Directors to take such measures as shall appear to them most effectual for restoring Lord Pigot to the full exercise of the powers vested in him by the commission from the Company, as Governor and President of the settlement of Madras, and for inquiry into the conduct of the principal actors in imprisoning his Lordship, and dispossessing him of the exercise of the legal powers wherewithal he was invested.' The resolution was carried by 382 votes against 140. A little later the opponents of Lord Pigot succeeded in carrying a resolution in the Court of Directors condemning his conduct for receiving certain presents from the Nawab of Arcot.

On the 7th of May 1777, the Court again met and resolved that Lord Pigot's restoration should immediately be followed by his recall in order to facilitate an inquiry into his conduct. A temporary Government to administer the country during the proposed inquiry was appointed with Thomas Rumbold as the President and Governor. As the result of the inquiry the guilty members of the Council were recalled and tried before the Court of King's Bench. Paul Benfield was also recalled, but he managed to return to India in 1781.

According to the records of the Company Nawab Muhammad Ali Walajah owed 22,25,373 pagodas (huns) to the Company after the fall of Pondicherry in 1761. In 1766 the debt of the Company to the Nawab after a careful scrutiny was reduced to 13,65,104 pagodas (nearly 50 lakhs of Rupees). The wars with Hyder Ali had completely exhausted the resources of the Madras Government. Bengal had contributed 265 lakhs of rupees to the Madras Government to carry on warfare against Hyder Ali. At this time the Madras Government had gone absolutely bankrupt. The Nawab had incurred more debts from the Company during the past fifteen years to run his day-to-day administration. The mismanagement of his revenues had exhausted his treasury. When Macartney was appointed Governor of Madras in 1780, he promptly took up the question of the Nawab's debts and after a careful scrutiny compelled the Nawab to assign his revenues to the Governor of Madras, for a term of five years, reserving one-fifth of the collection for his personal expenses. The Nawab questioned the figures and tried to prove that the Company owed him 14,72,515 pagodas, i.e. (nearly 50 lakhs of rupees). But Macartney refused to recognise the Nawab's claims. He appointed a Committee of assigned revenues on his own initiative in order to introduce reforms in the revenue administration of the Nawab. The net revenue was increased from six to twelve lakhs of pagodas. In three years Macartney succeeded in collecting nearly thirty-four lakhs of pagodas or over a crore of Rupees to recover the Company's debts from the Nawab. The Nawab was averse to this arrangement and used his best endeavours to secure its abolition. He sent a mission to Fort St. William to induce the Government there to cancel the arrangement. Macpherson and Coote were in favour of annulling the assignment. Coote wanted to get special powers from the Governor-General's Council to enforce the decision in case Macartney evaded to comply with it. He wanted to retain the assignment of revenues until the Nawab's debts were liquidated. When the matter came

before the Governor-General's Council it was decided to cancel the assignment, but no provisional powers were given to Coote to enforce the decision of the Council. The whole attitude of the Governor-General, Warren Hastings, remains obscure with regard to this affair. It was he who proposed that Coote should be given special powers to enforce the decision of the Governor-General's Council. But this was probably simply to show off; his private opinion being in favour of retaining the assignment. And Macartney knew this. Macartney refused to render up the assignment, in spite of the orders to that effect from Bengal. But in 1785 the Court of Directors, after considering Nawab Walajah's petition, decided in favour of annulling the assignment. Macartney resented this decision, resigned and went home.

In December 1784, the Court of Directors decided to promote a settlement with the Nawab, deprecating the difference that had arisen between him and Lord Macartney. The Court of Directors addressed a letter to the Nawab which runs as follows :—

'With respect to the assignment Your Highness was pleased to make of the revenues of your country in December 1781, we consider that transaction as a proof of Your Highness being impressed with the necessity of the defence of the Carnatic; but having by the cession of the assignment, manifested to Your Highness, and to all India, how little we wished to encroach on the rights or possessions of the native princes, it is just we take effectual care to guard our own. By the peculiar relation with the British Government and our possessions in the Carnatic bear to those of Your Highness and the Raja of Tanjore, as well as by several specific agreements, the sword for the general defence of that country is placed in our hands, and no consideration will induce us for a moment to surrender it. Towards its support in peace and defence in war, it is reasonable that country should contribute to its protection.'[1]

The documents in the Saidiya Library deal at length with the question of debts. In order to strengthen his case, the Nawab has enumerated the services rendered by his house to the English nation in India. In this connection he has presented the background of the history of that period in the shaping of which he himself played a by-no-means insignificant role. He has given a brief description of the struggle between the English and French for the supremacy in the Carnatic. He also makes reference to the dispute for succession which ensued at the death of Asaf Jah I and which was further complicated by similar contention in the Carnatic in which the English and French were compelled to intervene. Other matters of historical importance referred to in these papers are the following :—

Dupleix's diplomacy; the affairs of the Northern Sirkars and Tanjore; rise of Hyder Ali; the affairs of Madura and Tinnevelly; and Yusuf Khan's rebellion.

It goes without saying that great historical interest attaches to these documents. I am preparing their complete English translation which will soon be ready for publication.

[1] *British Power in India*, by Auber, vol. ii, p. 24.

THE STATE AND ECONOMIC LIFE IN GERMANY

BY

ANWAR IQBAL QURESHI

THE state intervention in the economic life of the people in Germany reached its climax during the Nazi National Socialistic regime. But for a long time Germany has never been free from state intervention. Even before the War the State was following a policy of intervention by tariffs and other means—measures which look very innocent in comparison with the present drastic state control measures which cover production, exchange, distribution and even consumption. Before the War the Government had deliberately encouraged the production of cereals in Germany through tariffs. But it was found during the food shortage in the Great War that this production in cereals had been encouraged at the expense of home supply of meat and other dairy products, the need of which was acutely felt during the blockade, and Germany had to pay very heavily for this mistaken policy of encouraging wheat and other cereals at the expense of the dairying industry. After the War, many attempts were made to rebuild the demolished and exhausted industry of agriculture but too great an intermixture of politics with economics spoiled the whole thing. Currency inflation aggravated the situation and the final collapse of the Mark brought about a complete catastrophy.

Increasing attention was devoted to rebuilding agriculture during 1924–32 and scores of laws were passed to help the farmer. In the beginning, high tariff duties were imposed on the import of many agricultural products, and when this did not achieve the desired end, attention was diverted to marketing aids, the indirect operation of the Government in the market, and planned and regulated consumption. Finally, the aim was to socialise consumption. In the meantime the condition of the farming classes was growing from bad to worse.

The indebtedness of the farmers was increasing at an alarming rate. It increased from 7,300 million R.M. in 1925 to 11,765 million R.M. in 1932, and the burden of interest increased from 425 million R.M. in 1925 to 1,005 million R.M. in 1932. The number of forced sales of properties increased from 2,554 in number in 1927 (36,713 Hectares) to 6,121 in number (1,51,325 Hectares) in 1932.[1]

All this happened in spite of increasing state intervention. Over thirty laws were passed between 1924–32 to regulate the prices in order to ameliorate the condition of the farmers, which in spite of all these continued to deteriorate. It is interesting to know that all these laws were not passed with the genuine motive of helping the farmers but as a measure of political expediency and compromise. Here we reproduce a rather lengthy quotation to show this conflict of interests.

'One of the new bones of contention for the political arena was the agricultural price policy, in that it was tossed into the arena with its complicating features, Government protection through tariff acts, treaties, market aids, and finally the regulated consump tion. Though the old producer-consumer conflict of the inflationary period between urban and rural groups persisted, the Government protectionistic measures, inaugurated as soon as the Currency stabilisation and the Versallies Treaty commercial restrictions permitted, furnished a basis for a new combination of interests. Grain and animal commodity producers received tariff protection by virtue of alliance with industry against labour. But this advantage to the grain producers was lost as soon as industry sought and found support from labour and to some extent from the small farmers and animal products producers in making favourable commercial treaties at the

[1] Holt, J. B., *German Agricultural Policy*, pages 138, 139.

expense of the grain producer. A gradual swing of the "mixed" middle parties when the grain price depression set in with full force finally broke industry-labour small farmer combination and established grain protection by means of regulation of grain consumption at the expense of the small farmer and industry.'

'In this change of policy national ideology played an important part. The establishment of Government apparatus for grain price control (grain trade monopolies) was made possible as much by a Social Democratic ideology as by the grain producer agitation for the price control at all costs.'[1]

How the Nazi party came into power is partly explained by the fact that as the small farmer and the labourers were left without support from other parties they rallied to the Nazi ranks.

German Agricultural Policy under the Nazi Regime

As explained above, the farmer was attracted in the beginning towards Naziism not owing to his faith in their philosophy, but as a protest of dissatisfaction against other parties. However the Nazi leaders were not unaware of the real situation and they fully realised that it was absolutely necessary to win the active support of the farming classes in order to carry out their plans successfully. It was with this aim that the party appointed its best agrarian leader—Darre—to preach national socialism amongst the farming population, and he prepared a very attractive programme to win the support of this class. We quote below some of the salient features of the programme in order to indicate its comprehensiveness and to show how the farming population was imbued with hatred against the Jews by making them believe that it was really the Jews who were mostly responsible for their troubles. Explaining the causes of low prices of agricultural products and especially the small returns received by the farmers it was pointed out in the programme that:

1. The present tax policy imposes a comparatively heavy burden on agriculture as compared with industry. The reason given for this ill treatment of agriculture is that this state of affairs has come into existence through the political party interests and as German democracy was run by the Jewish world financial organisation they have deliberately brought about the destruction of the German people.
2. The anti-agrarian policy.
3. The unpermissibly high profits which the wholesalers of agriculture products charge by coming between the producers and the consumers, and this business was mainly in the hands of the Jews.
4. The usurious prices which the farmers have to pay for commercial fertilisers and electricity, generally to Jewish concerns.

Nazi Remedies

Before we describe the remedies that were suggested by the Nazi leaders to cure the ills of agriculture and to win the support of the farming population it is necessary to understand the Nazi Ideology on which their whole programme is based. It is the intoxication of this ideology which makes a person apparently immune from any other dangers and under its influence he is prepared to do anything.

Nazi Ideology

The following are the two main principles of Nazi Ideology:

(1) 'The Folk or racial unit bound by language, blood, and cultural heritage, is the most fundamental unit in the social-economic-political evolution of mankind. A rupture of its cohesion through class warfare, foreign cultural influence, or blood mixture, leads to its disintegration.'

[1] Holt, J. B., op. cit., page 166.

(2) 'The greatest disintegrity to the German folk lies in the materialisation of its standards through the growth of capitalistic society with its emphasis on the individual, its division of Folk into warring classes bound to one another by no higher moral ties of mutual obligations, and the ascendancy of a capital and interest paying mentality and actual economic and political power (claimed to be predominantly in the hands of the Jewish international capital-lending monopoly) over moral obligations to German Folk and its future.'

One requires a great deal of concentration of mind to comprehend and even after due consideration one hardly understands what all this Jingoism means. But these high sounding words carried great weight with the simple-minded farmers. The basic idea underlying Darre's programme (which we shall describe below) was to bring home to the farmer that he was really something *great and noble.*

The Agrarian Policy of the Nazi Party

Here are some salient features of the Nazi propaganda which was carried out in 1930 in order to win the farmers' vote.

1. German Soil, taken and defended by the German people provides a living area and the means of subsistence for the whole German people. So only German folk may be in possession of German Soil. (This amounts to expropriation of Jewish landlords.)

2. Lands acquired by lawful German folk is regarded as an inherited property. To this property, however, is attached the duty of using the soil for the good of the whole people. Vigilance regarding this obligation is the task of Vocational Courts, which are composed of representatives of all vocational divisions of the agricultural population.

3. German Soil must not be an object of speculation and a source of effortless income to the owner. In the future only a person who cultivates it himself can acquire land. Therefore the State has a pre-emptive right in the sale of land and soil. The use of land and soil to secure debts to private moneylenders is prohibited.

4. For the use of German soil the owner must pay to the State a tax in keeping with the quality of the property. No other taxes are to be imposed on agriculture.

5. The inherited rights of land and soil are to be adjusted in such a way that the land may not be divided into many parcels and no burden of debt imposed on it.

6. The State reserves the right of expropriation at reasonable cost especially of those landholders who according to the judgment of the Vocational Courts, do not farm the land, in a fit and proper manner or who no longer serve to supply food to the German people.

7. Land will be given to landless persons who are prepared to exploit it in the interest of the nation.

This programme was to come into operation as a permanent policy when the Nazi party came into power. However it would have taken some time to put it into practice, and the paralysis from which the agricultural industry was suffering needed some immediate relief and in order to win the support of those who were suffering, the party offered the following attractive programme :—

Immediate Relief Measures to help the Distressed Agriculturists

1. In order to offer immediate relief it was suggested that a halt should be called to further rise in agricultural taxes, and reduction in the farmer's indebtedness was to be achieved at once by reducing the rate of interest to the pre-war level and to take severe action against usury. It is interesting to point out here that during the period of the currency crisis and some years after it, the German farmers had to pay exorbitant rates of interest ranging from 18 to 60 per cent per annum to get credit and even at these usurious rates it was difficult to find any accommodation.

2. The State was to adjust its economic policy in such a way that agricultural work should become remunerative. Domestic production was to be protected by import duties, Government regulation of imports, and consciously planned national education. The price formation of agricultural products was to be withdrawn from the speculating influences of the produce exchanges and the exploitation of farmers by wholesalers and distributors was to be made impossible by suitable State action, and the carrying out of the wholesale business by the farmers co-operative organisation was to be encouraged. The Vocational Organisations were to find out ways and means to reduce the cost of production and to increase the total output.

3. The interests of the general labourers were to be specially safeguarded.

4. The cultural side of farm life was to be developed by means of vocational education for youths by opening clubs, and by other such means.

The Nazi Agrarian Policy in Practice

When the Nazi party came into power in 1933, they did not take long to put into practice some of the important aspects of their agrarian policy. In order to understand the full significance of the Nazi Policy, it is essential to bear in mind that in their scheme of things the interest of the community must be placed above all other interests, and every possible propaganda was carried out to bring home to the farmer that he was something great and noble—a regenerator of the community—and far above ordinary men.

In the first speech that Darre made after the coming into power of his party he declared ' By being able to take firm root in his inherited soil, the yeomen should be enabled once more to become the instrument of the racial regeneration of the German people.' In Nazi Germany all economic activities are carried on in the interest of the community as a whole and all private economic and commercial interests must be subordinated to the interest of the State. This is clear from one of the early speeches of the Nazi leader : ' All activities will be governed by the law that the nation does not live for the benefit of the economic system, nor the economic system exists for the benefit of capital, but capital serves the economic system and the economic system the State.' The farmer appears very prominently in the Nazi programme as it is by the yeomen class that they want to build a bulwark against the invasion of communism and make Germany a self-sufficient nation. A further feature of the Nazi policy is ' the speeding up of old, and the creation of new plans for the organisation of all economic resources within Germany in such a way as to render the country as independent of foreign supplies as possible with a view to guaranteeing the basis of existence for the nation under any circumstances. It is contended that the failure of the farmer will lead to the collapse of German economy and also spell disaster to the whole German nation. Not only is the farmer regarded as the prime source of food supply, but in addition, as a political bulwark against communism and an important factor in helping to maintain the high birth rate.'[1]

It is clear from the above quotation why the farmer has become a centre of the Nazi activities.

The Inherited Freehold Act

The most revolutionary thing that was done by the Nazi party when it came into power was the passing of the Inherited Freehold Act. The most important feature of this Act is that it has prohibited the sale of farm real estate. This means that no security has been left for advancing long term loans. The Roman Law which gives absolute power to the holders of the properties was ridiculed by Darre as it perpetuates the evils

[1] Rowlins, E. C. Donaldson, C.M.G., C.B.E., *Economic Conditions in Germany*, 1936, H.M.S.O. (London).

of private ownership and land speculation and encourages indebtedness of the proprietors which eventually deprives them of their ownership of land. The Nazi party defends this act on the ground that by prohibiting the sale of farm land, they have made it impossible for the farmers to run into debt to the private moneylenders who had been sucking the blood of the German peasantry, and also they have made it possible for the farmers to inherit their ancestral land without any incumbrance or obligations. The obligations that are imposed on the farmers now are due to their privileged position as food producers and race generators of the nation. Now a German farmer cannot marry a girl that he loves if she does not belong to the Aryan race. Marriage is no longer considered as a personal and private affair. As a regenerator of the German race the farmer must accept these obligations. It is surprising that a thing like marriage, which is partnership for life and requires mutual harmony and love, is made a matter-of-fact thing. Cases are not unknown where persons have been sent to jail for marrying in the prohibited circle. The idea of the Nazi party is to create a new type of nobility—the yeomen nobility—in contrast to the landed aristocracy which existed in the previous century. 'The new nobility expression carries with it the idea that this part of the farm population will be the backbone of the national political morale, just as formerly the landed nobility secure on their Fideikommiss entail estates were the backbone of the monarchical state.'[1]

No borrowing is allowed on the security of these freeholds. The freehold cannot be removed from the family possession except by the order or the approval of the State. As regards inheritance it is governed by the law of primogeniture and if the inheriting son proves to be a bad farmer, the freehold goes to the next in line of inheritance. This policy has resulted in the cessation of lending any money on the security of land. In order to fill this gap the State had to step in and had to provide drainage and other facilities to improve the soil. In the absence of any security for long term credit, personal credit plays a more important part, and this field has been left to the co-operative societies.

Organisation of Marketing

In order to organise agriculture on the national corporation basis, the following law was passed in September, 1933. It is called 'The Act concerning the Provisional Organisation of the National Corporation of Agriculture and Concerning Measures for Regulating the Market and Prices of Agriculture Produce.' This is the cardinal centre of the national socialistic laws concerning agriculture, as it is this framework within which all the agrarian laws are built. This Act empowers the State to regulate the marketing of agriculture produce prices, for the guaranteeing of a minimum price to the producer of wheat and rye, and also fixes the prices at which the mill owners are compelled to buy these products from the farmers. In later years it became the policy of the Nazi Government to fix prices for all sorts of agricultural products. The explanation offered for this increasing intervention by the State was that owing to their peculiarly privileged position—service to the people as the food producers, and regenerators of the new German nation—farmers were entitled to special consideration. We take the liberty of reproducing another quotation to show the Nazi explanation for adopting this policy.

'Since in the free play of liberalistic commodity exchange relationship a just equalisation between farm produce and industrial products could not take place, or in other words the price scissors which had been opened to the disadvantage of agriculture could not be closed, the laws of the liberal economy had to be eradicated from the economic system. Where the liberal mechanism of the market failed, an order had to be instituted which insured a just price for the farmer's products and which thereby excluded from the world the dangerous factors of the price scissors.' In plain English it boils

[1] Holt, J. B., op. cit., page 206.

down to this, that the free forces of supply and demand no longer operate in the German agricultural market and the prices are no longer determined by these forces but by the executive fiat which is officially called 'The rationalisation of the marketing organisation in the most efficient manner.'

The first step towards this rationalisation was taken by other political parties before the Nazi party came into power. This was the setting up of The Reich Corn Monopoly in 1930 which provided that all corn must enter the market only through the monopolistic organisation which levied a tax on the sale of corn which was borne by the consumers at home. Under the Nazi regime in the first half of 1933, oil-seeds and fats were also brought under the monopolistic control of the Government, but these 'comparatively mild' measures of State intervention did not achieve the desired end and it became necessary to pass some more drastic laws. This was done by passing The Guaranteeing of Grain Prices Act, and The Consolidation of Grain Mills Laws in September 1933, which provide for the complete control of agricultural prices. The Nazi idea is that commerce and industry safeguard their interest by combination and cartels, but the farmers are denied these facilities owing to the inherent nature of the agricultural industry. That is why the State wants to help the farmers in their helplessness. In this connection Darre remarked 'Furthermore we must make clear to ourselves that the farmer is no longer an entrepreneur in the ordinary sense of the term. The food producer cannot and should not take part in the game of price making. He must not be thrown upon the dangers connected with this game, because his function for the nation is extremely important. We need the farmer, as a source of new blood for the German people and we need him also as the food provider for the German people.'

It is clear from the above quotation and many other utterances which we have already quoted, that the Nazi Government is not concerned as much for the farmers' welfare and with providing them with good returns for their labours by way of higher prices, as was originally advocated, but is more concerned with increasing the food production for the German people and with increasing the population of the country. In other words farmers are to be only food- and children-producing machines in order to satisfy the egoistic notions of the self-conscious State. This idea was put into practice by passing the 'Act for regulating the Grain Business', in June 1934. The immediate cause which led to the passing of this Act was the summer drought of 1934.

Regulation of Grain Business

The following are the main provisions of the Act for Regulation of the Grain Business :—

(1) Growers of domestic wheat or rye were compelled to deliver their produce at fixed prices.

(2) Co-operative dealers or other distributors were required to buy it at fixed prices.

(3) Mill owners and other processors of these products were required to acquire and sell them at the prices fixed by the State.

These prices were fixed by the Minister of Agriculture. Farmers suffered considerable losses owing to this executive fiat but they were told that they must be prepared to suffer losses for the sake of their community.

Multiplicity of Laws in Germany

It is not an easy task to give any comprehensive idea regarding all the laws that have been passed in Germany during the last two years which directly or indirectly affect the economic life of the people and provide increasing control of the state in one direction or the other. During the year 1934 alone altogether 202 laws and 436 decrees were issued which covered all aspects of life and business. To this 150 laws and over

700 decrees were added in 1935 and considerable further addition has taken place during the present year (1936).

It is a most formidable task to give a full description of all these measures, but in order to show the part which the State plays in controlling the economic lives of the people we give here below in brief the description of various types of laws that have been passed in the recent years :—

(1) Law for Regulating National Labour

This law was passed in January 1934 and is considered as the Magna Charta of National Socialistic, German Labour.

The following are the main provisions of this law :—

(*a*) In each firm the owner of the firm as the leader, and the salaried and wage-earning employees as his followers, should work together for the purpose of the furtherance of the firm and for the benefit of the nation and the state in general.

(*b*) The leader of the firm shall make decisions for his followers in all matters affecting the firm in-so-far as they are governed by this Act. He shall provide for the welfare of his followers while the latter shall be loyal to him as fellow members of the works community.

It may be pointed out here that in accordance with the fascist idea, strikes and lock-outs are prohibited, and are punishable offences. The labourers, along with other classes of the nation, are expected to make sacrifices for the national cause. Owing to the vigorous pursuit of the policy of self-sufficiency, the cost of living in Germany has considerably increased during recent years, but the wages paid to labourers have lagged behind. The prices of all important food products are several times higher in Germany than the world prices, but in spite of the increased cost of living the German labourers had been made to be content with their lot for the interest of the nation. We reproduce a table below to show the difference between the prices of important commodities in Germany and the world prices.

	Germany Wholesale *Price*	World Wholesale *Price*
	(In Swiss Gold Francs)	
Wheat	211·5	72·4 (London)
Rye	167·0	58·5 (Posen)
Barley	199·1	50·7 (London)
Rapeseed	320·0	157·2 (London)
Flax-seed	260·0	148·2 (London)
Wool	6,580·0	1,441·2 (London)
Pork	1,420·0	922·1 (Copenhagen)
Sugar	406·8	104·8 (London)
Butter	2,540·0	1,206·4 (Copenhagen)
Eggs	10·0 Per hundred	7·1 (Copenhagen)

The above table hardly requires any comment.[1] The German prices of several products are many hundred times higher than the world prices. And owing to this heavy cost of living the cost of production in Germany has considerably increased and has very seriously diminished the ability of German exporters to compete in the markets of the world. We shall deal with this aspect in a later section.

Eleven of the most important food products are controlled by the Central Marketing Boards and the prices of these products are determined irrespective of the world prices.

[1] E. C. Donaldson Rawlins, op. cit., page 37.

(2) Domestic Labour Law

This law was amended to guarantee adequate wages to the domestic labourers.

The following two laws were passed to safeguard the interest of lower middle classes :—

(3) Law for the Protection of Handicrafts

This law was passed early in 1935 and provides that a person desirous of doing handicrafts business must prove that he possesses adequate skill in that industry and is competent enough to carry on with this business. The idea underlying this law is to eliminate inefficient workers and to avoid the multiplicity of works which depress the industry.

(4) Law for the Protection of Retail Trade

This law was passed along with the law for the Protection of Handicrafts, and the Regulations under this law provide for the licensing of all new shops. In practice no licence is granted unless it is shown that the applicant is competent and a shop of that particular type is required in that area. It also affords protection to the existing shop-keepers from unfair competition. Departmental and multiple stores are discouraged in Germany and every possible help is given to the owner of small shops.

(5) Law concerning Commercial Propaganda

This law was passed in September, 1933 and provides that all advertisements, as well as the holding of fairs and exhibition should be controlled by the Propaganda Council of Germany and their approval must be obtained before any advertisement is published. This Council levies a fee on the income received from the advertisement. Fair and other shows are strictly controlled. This law also acts as a check against fraudulent advertisement and provides for an advisory board to give scientific advice and other necessary help to advertisers of good and genuine articles.

(6) Laws Relating to Agriculture

The various important laws that relate to agriculture have already been mentioned in the previous pages.

Decree establishing the Department for Planning National Territory

This decree was made in June, 1935 and its aim is to prevent any overflow of population from the countryside to the towns. Various facilities and amenities are provided to the country labourers in order to encourage them to stay in the country. Regulations made under this decree also deal with the location of certain industries, the uniform planning of settlements, roads, buildings, etc.

(7) Law for the Promotion of Power Supply

This law was passed in December, 1935 and provides for the securing of efficient and cheap supply of electric power and gas for the German people both in time of peace and war.

(8) Laws effecting Transport, Road Building, and Motor Traffic

Various Laws and Decrees have been passed dealing with the above subject and the main purpose of these laws is to avoid the ruinous competition between the various branches of transport. In order to encourage the development of the automobile industry, a law was passed to exempt the users of private cars from all motor taxes.

(9) Banking Law

This law is the outcome of the recommendations made by the Banking Enquiry Committee's Report, which was published at the end of 1934. This Law provides for the supervision of banks by a board under the Reichs bank. It authorises the board to make regulations regarding the investment and liquidity of Credit Institutions. It may be mentioned here that the Committee reported against the nationalisation of banks and suggested only State supervision. Regulations have been issued by the board to prohibit the issue of cheques on Savings Accounts and for keeping the accounts and investments of Savings Banks separately from other accounts and investments. Increasing privileges have been given to the Reichsbank to demand detailed information regarding the affairs of banks.

The Economic Effects of State Intervention in Germany

The task of the economist in estimating the economic effects of these multifarious regulations which touch every aspect of life and work in Germany, and in pronouncing his judgment, is at once both very easy and very difficult. It sounds contradictory, but all the same it is true. It is easy because the Nazi leaders are bold and honest enough to declare frankly that it is not the economic considerations which weigh heavily with them, and no attempts have been made either to dupe their own nationals or other nations about the economic soundness of their doctrines. On the contrary it has been repeatedly proclaimed that the German people must be prepared to sacrifice not only the luxuries and comforts of life but even many necessaries in order to secure national solidarity. When people have been faced with shortages of many necessaries of life and the prices of other similar commodities have soared to high levels without any appreciable rise in their wages they have been told to bear this burden with smiling faces, as the sacrifices will result in making the German nation immune from foreign dangers, especially that of communism.

Speaking at a recent meeting Herr Rodolf Hess, Hitler's Deputy remarked 'Let no one think that if the economic war against the nation failed, Germany would be overpowered by force of arms—by an invasion of Russian militarism. We have made provision. We are ready now and in the future to manage with less fat, less pork, and fewer eggs, because we know that this small sacrifice is a sacrifice on the altar of our national freedom.' Addressing the German housewife, he further remarked 'Every new gun, every new tank, and every new aeroplane, increases the security of the German mother and guarantees that her children will not be murdered in an unhappy war, nor assassinated by Bolshevist gangs. We are taking good care that the desire to attack us should vanish entirely. You, my German housewives, influence the mood of your husbands, the nation's mood depends a great deal upon you. A good housewife does not mourn because she cannot obtain a quarter pound of pork.'[1]

The wonder of all wonders is that the German housewife (from all available records) is willingly prepared to make these sacrifices. In a case like this an economist has no quarrel, and his task is easy, because the investigation falls outside his province. However, when it is claimed that the economic advantages of this policy have been very great, the task of an economist becomes rather formidable.

Everything that is happening in Germany is covered with mystery. There is great lack of any information on which to base one's conclusions. During the last two years even no detailed account of the budget has been published. The statistical data manufactured by the State Agencies can be hardly relied upon as the basis of any scientific enquiry owing to lack of any independent check of this data. The matter has

[1] Reported in the Times of India, Bombay, dated 26-10-1936.

been further complicated by the multiplicity of various grades of currency in the country and various rates of foreign exchanges for the same unit of currency. The Reichs mark does not always mean the same thing in all transactions. The value of the Mark depends upon the nature of the transaction. Although Germary is still nominally on the gold standard, in practice she is far from it. There are more than 13 different Reichs marks which enter into German accounts, and owing to this cumbersome multiplicity of currency units it is almost impossible to attach any value to the German statistics.

The Economic Impact of German Policy

In addition to the unreliability of German statistics, the reader is baffled by the multiplicity of laws which have come into existence in Germany in recent years and he naturally asks what is the net result of this policy and what lesson does it afford? We shall attempt below to outline the achievements of this increasing State intervention and shall try to find out what lesson it affords to countries like India or what are the possibilities; a question which is of more direct and vital importance to India—of developing better trade relations with these State-ridden European countries, and how far we can increase our trade by means of bi-lateral or other such agreements?

Rise in Agricultural Prices

The Nazi Policy has been very successful—perhaps more successful than they want now—in increasing the prices of agricultural products.[1] Between 1933 and 1935 the price level of agricultural products rose by 40 per cent. The Index Number for the price of wholesale agricultural products rose from 80·8 in January, 1933 to 108·8 in February, 1936. The agricultural policy which the Government adopted when it came into power has benefited the large-scale producers more than the small farmers, as the large farmers were able to take immediate advantage of their surplus production while a small farmer had to consume a good deal of his production at the farm and had little to sell from which he could derive the benefit of rising prices; while he had to pay more for his needs when he had to buy them from the market. As a result of this policy German production increased in various directions and achieved self-sufficiency in many important products. The policy of autarchy (it expresses the meaning more precisely than the English phrase economic self-sufficiency) has been pushed to its utmost extreme without any consideration of cost. As a matter of fact there is not a single important item in the import list which is not attacked and regarding which efforts are not made to decrease the imports of those products by developing production at home irrespective of the cost of production. The efforts made by German authorities to produce many important commodities by synthetic means has increased the cost of production of those commodities several hundredfold. This phase of the autarchy will be described in another section. Here we shall give figures to show the amount of self-sufficiency reached during 1934.

Ratio of Domestic Production to Total Supplies *by Percentage.*[2]

Per cent.	
100–90	... Coal, bread grains, vegetables, meat, potatoes, sugar, oats, barley.
90–70	... Rayon, timber, casings, bristles, casein, eggs, honey, fruit, milk products, wine.
50	... Hides and skins, fish.

[1] For details see Rawlins, op. cit., Chapter III.
[2] Rawlins, op. cit., page 71.

Per cent.		
50–30	...	Non-ferrous ores, motor fuel, fats in general, nuts, feathers.
30–20	...	Iron ore, tobacco.
20–10	...	Flax, tanning material.
10–5	...	Textile raw materials in general, wool.
4–1	...	Oil seeds, Oil cake and Vegetable oils.
Less than 1 per cent...		Cotton, hemp, jute, silk, rubber, resins, shellac, etc.

But this partial autarchy in many important products has not been reached without sacrifices. Germany had to pay a very heavy price indeed to achieve this end. We have already given a table on page 10 showing the difference between the prices in the German market and the world wholesale prices. The net achievements of this policy are described in the extract reproduced below by an impartial student of German Economics and has been quoted by Rawlins.

'From a commercial point of view—that is, regarding the country as a business concern among others in a world economy—is not Germany living on her capital? Has not the business boom based on work creation, rearmament and autarchy been organised and is it not being maintained, at the cost of increasing her economic isolation from the rest of the world? Is not this policy causing progressive impoverishment and is it not already pressing hard on both the standard of living and export trade?'

Production of Synthetic Products

In spite of heavy costs of production desperate efforts are made in Germany to encourage the production of synthetic products in order to achieve autarchy.

Motor Fuel

Motor fuel is an important basic commodity for any nation which wants to supply its own needs from within its own borders. Unfortunately for Germany there are few natural oil springs in the country from which the supply of this commodity could be obtained. But this absence does not discourage the enthusiastic advocates of autarchy. On the contrary increasing attention is devoted to the supply of this important item of warfare and industrial necessity, and tremendous efforts are made to encourage the synthetic production of petrol, benzol, and alcohol. The domestic production of petrol increased from 250,000 tons in 1934 to 365,000 tons in 1935. It is hoped to increase this production to about 600,000 tons by the end of 1936. The domestic production of benzol increased from 280,000 tons in 1934 to 380,000 tons in 1935. It was hoped to increase this to over 420,000 tons by the end of 1936. The production of domestic alcohol increased from 170,000 tons in 1934 to 180,000 tons in 1935, and it was hoped to raise it to 200,000 tons by the end of 1936.

Vigorous researches are being carried out in Germany to increase the synthetic production of rubber. The example of other products can be easily multiplied. India is particularly interested in the export of hides and skins to Germany but we must warn our exporters that there is little chance of any increase of our exports in this direction to Germany, or as a matter of fact even in our maintaining the status quo; for every possible effort is being made in Germany to make the country independent of foreign leather supplies. The domestic production of leather at the present moment supplies 50 per cent of German needs, and efforts are being made to produce more leather by increasing the number of cattle and by encouraging substitutes for leather.

German Trade Policy

Import Trade

Free economic forces no longer play any important part in the trade policy of Nazi Germany. The import trade is very rigidly controlled by the State, which has created 27 centralised control boards, the prepondering majority of which have their offices in Berlin. Each board controls the import of those commodities which are specially allotted to it. For every import an Import Certificate has to be obtained from the respective Control Board which only grants it if it is considered that the import is necessary for the welfare of the country, and enough foreign exchange is available for its purchase. The object of this plan is to discourage unnecessary imports and to safeguard the balance of payments. One need not dwell here on the great hardship which this highly centralised and rigidly State controlled system has imposed on the German inporters.

Owing to the pressure of this policy the imports of various commodities in which India is particularly interested has considerably declined in Germany. The import of wheat decreased from 71·8 million R. M. in 1933 to 14·7 million R. M. in 1935.

Decline in the Import of Wool and other Products

Between 1934 and 1935 the import of raw wool decreased from 322 million R.M. to 248 million R. M. Skins for furs decreased from 53·5 to 46·5 million R. M. and oil seeds and fruits from 290 million R. M. to 155 million R. M.

Decline in the Import of Cotton

The Import of Cotton decreased from 393 million R. M. in 1933 to 223 million R. M. in 1934, but again rose to 293 million R. M. in 1935.

The causes of this increase are not only interesting but also throw a good deal of light on the German trade policy. Therefore we shall describe them in some little detail. The German cotton import trade has taken a new turn since the policy of bi-lateral trade agreements has come into force. The group of countries which was previously supplying cotton to Germany has suffered a great decline in their export of cotton while a new group of countries which has entered into bi-lateral agreements with Germany has gained a good deal. These changes were necessitated owing to diversity of international trade and because of foreign exchange restrictions. In 1933 three-fourths of German imports of cotton were supplied by the U. S. A. In 1935, The U. S. A.'s share was reduced to barely one-fourth. In 1935 Brazil, Argentina, and Peru supplied Germany with 40 per cent of her cotton needs, although two years before their share was only negligible. Before we explain the causes of this diversity we shall give a table to show the change which has taken place in the import of cotton in Germany from various countries, and a decline in the share of the older group and a considerable increase in the share of the new group.

German Cotton Imports

	1933	1934	1935
		(in R.M. million).	
Total imports in value	293	231	293
	1933	1934	1935
		(in metric tons).	
Total imports in bulk	416,600	316,900	310,000
From old supplying countries—			
U.S.A.	313,100	189,800	74,900
India	35,700	34,800	27,900
Egypt	39,000	44,200	39,300

	1933	1934	1935
From new supplying countries—			
Brazil	...	8,300	27,900
Peru	9,700	11,300	25,200
Argentina	5,300	5,600	14,400
Turkey	600	5,700	15,200

It is interesting to note from this table that in 1935[1] Germany paid the same amount of money for 310,000 metric tons of cotton as she paid for 416,600 metric tons in 1933. It means, that by paying the same amount she got 25 per cent less cotton in 1935 than in 1933. This is the price which she had to pay for her clearing agreement system and State Intervention. As already stated German Import policy is not dictated by economic considerations but by contingencies of exchange. In the ordinary course the German balance of trade with the U.S.A. is passive. She has to pay America in gold which is far from being in excess in Germany and consequently it became necessary for her to look for other avenues. Germany exported more to South American countries few years ago than she imported from them. In order to increase her import and export trade she entered into clearing agreements with a group of South American countries as she could not receive the surplus of her exports in gold owing to exchange restrictions in the South American countries. The only avenue that was left to Germany was to increase her import of raw materials from these countries.

It is generally presumed in India that the Indian export trade has suffered in the German market owing to the Ottawa Agreement. Whatever may have been the other repercussions of the Ottawa Agreement, this much is clear from the statistics available, that the Ottawa Agreement had nothing to do with the decrease of our exports to Germany. The imports from India into Germany decreased from 153·9 million R.M. in 1933 to 121·3 million R.M. in 1935. We are not the only country to suffer. The U.S.A. which had no Ottawa Agreement suffered more than we did. The total imports from the U.S.A. into Germany decreased from 482·8 million R.M. in 1933 to 240·7 million R.M. in 1935. Taking other Empire countries the total imports from Australia decreased from 105 million R.M. in 1934 to 35 million R.M. in 1935. The imports from New Zealand declined from 35·6 million R.M. in 1934 to 4·3 million R.M. in 1935. Canada, which provided wheat to Germany, found that its exports of wheat to Germany declined from 55½ million in 1933 to 37½ million in 1934 and disappeared altogether in 1935.

German Export Trade

The figures of German export trade are very interesting to a student of economics as they clearly show the relationship between the economic forces and State intervention, and the price which the Interventionist must pay for tampering with the economic forces. Almost all students agree on this point that the blackest year of depression was 1932 and prices had reached to the bottom of the pit in that year. Afterwards the trend of the cycle began to change, and prices slowly began to rise. But in Germany we find that although the quantity of the goods exported in 1935 increased as compared with 1933, the prices received by German importers were less in 1935 for these increased goods than the prices for the smaller quantity, which they exported in 1933. The following figures may be studied with interest :—

TOTAL GERMAN EXPORTS

	Million R.M.	Metric Tons.
1933	4,871,405	41,831,624
1934	4,166,878	45,217,759
1935	4,269,667	50,137,310

[1] Rawlins, op. cit., page 160.

These figures do not reveal the whole situation in its true perspective. The decline in some exports for example, foodstuffs and raw material, was deliberately encouraged by the State and under the items, (1) live-stock, (2) foodstuffs and beverages, (3) raw materials and semi-manufactured goods, there was a considerable decline which was compensated for by a tremendous increase in the export of manufactured goods, to encourage which the Government took every possible step. But we find from the table given below that in spite of considerable increase in the amount of commodities exported there was a decline in the price received for them. The causes of this decline are many, the principal ones being (1) subsidised dumping, (2) desire to capture new markets, (3) political considerations.

EXPORT OF GERMAN MANUFACTURED GOODS

	Tons	R. M. Million
1933	4,214,101	3,787
1934	4,528,180	3,255
1935	5,557,668	3,418

Export Subsidies

It has been repeatedly pointed out in the previous pages that owing to increasing intervention of the State in the economic life of the country, and severe restrictions which have been imposed on the trade relations, and owing to scores of other laws which were enacted during recent years, the cost of production has increased tremendously. It has been also pointed out that the increased cost of production has seriously affected the ability of the German exporters to compete in the markets of the world. Under these circumstances one would naturally expect a far greater decline in the export of German products to the other countries, and when the reader is told that the decline has not been as serious as it should have been, he naturally asks why not? What were the other factors which checked the decline in the German export trade? The simple and brief answer to this is that heavy subsidies have been paid to the German exporters to maintain their positions in the export markets. It is estimated that during the year 1935 over one milliard R. M. were spent on these subsidies.

Subsidy Schemes for Exports

Another natural question which the reader will ask is what is the source of these large subsidies and from whence does the money come to pay such a large sum to the exporters? There are many sources which the German State is tapping to get this money, and some of them are very interesting and ingenious. In 1933-34 the main source of income for the payment of these subsidies was the sum of money which had accumulated in Germany owing to exchange restrictions which strictly regulated the payment of principal to foreigners on the accounts kept in German banks and later a complete moratorium was granted. The natural result of these measures was that the value of these accounts depreciated to a very considerable extent as the holders of them were not able to withdraw this money from Germany. Consequently they were prepared to receive anything in exchange of these accounts that they could possibly get. The nominal value of these accounts remained practically the same in Germany. Therefore the State encouraged the German nationals who had to receive payments from foreigners to purchase these accounts. The profits which the German nationals derived from these transactions had to be shared with the State, which used them for subsidising German exports.

The rigid exchange regulations which the Nazi party enforced when it came into power resulted in a great depreciation of German securities held abroad. A considerable

amount of money was invested in these securities by foreigners who to their dismay found them valueless for all practical purposes, owing to exchange restrictions. However the prices of these securities remained nominally unchanged within the German borders, and the State again encouraged its nationals who could command some funds abroad, to purchase them and then to re-patriate them. The profits arising out of these transactions had to be shared with the State and this was the main source from which the export subsidies were paid. The German Moratorium Law of June, 1933, which provided that all debts due by German nationals to foreigners were to be paid in R. M. in Germany and then made available to the foreigners in part cash but mainly in scrip certificates, further helped the State in collecting large sums of money, as these scrip certificates had little market outside Germany and were resold in Germany at heavy discount.

When these sources of income began to dry up another provision was made to provide subsidies for the exporters. This provision is styled as 'Self-help': a levy is imposed on all industrial concerns (whether producing for the home market or for export) and the money collected from these securities is pooled together, and from this pool payments are made to those export industries which cannot compete in foreign markets without such help. The amount of the subsidy given depended on the nature of the industry. This in practice amounts to the fact that the consumer of industrial products at home has to pay a heavier price and has to bear the burden of these subsidies. The lot of the consumer in Germany is rather to be pitied.

Decline in Consumption

One need not mention here the decline in consumption of those articles which are considered as luxuries and comforts because no such things as luxuries are tolerated in the Nazi State. The consumption of even those necessaries of life which are absolutely essential for maintaining the health of the nation has considerably declined, which has resulted in lowering the standard of living of the masses at large. The following table shows the per capita decline in the consumption of important foodstuffs in Germany.

COMMODITY	UNIT	1929	1932	1933	1934
Butter	Lbs.	15·9	16·3	17·6	15·3
Margarine	,,	17·3	17·3	13·0	12·3
Lard	,,	8·1	8·1	7·6	6·7
Total Fats ...	,,	41·3	42·0	38·3	34·3
Eggs	Number	...	120	101	99
Beef and Veal	Lbs.	43·0	37·2	36·1	40·7
Mutton and Lamb	,,	1·5	1·4	1·5	1·3
Pork	,,	67·5	68·1	70·1	77·5
Other Meats	,,	1·8	1·2	1·3	1·2
Total ...	,,	113·8	107·9	109·0	120·7

The increased consumption of meat in Germany in 1934 is due to an increase in the consumption of pork, which was due to increase in the slaughter of pigs and the comparative decline in their number. With the exception of the consumption of pork, the consumption of every other kind of meat was smaller in Germany in 1934 as compared with 1933. Now we find that there is a great scarcity of pork in Germany.

For comparative purposes it will be rather interesting to compare the consumption of these products during the same period in other countries where the restrictions imposed by the States are not as cumbersome as in Germany, and for this purpose we will take the case of the United Kingdom, where the import duties are comparatively low and the State intervention considerably less. The table given below shows that there has been considerable increase in the consumption of these products in the United Kingdom.

British Consumption per Head in Lbs.[1]

COMMODITY	1929	1932	1933	1934
Butter	17·8	21·8	23·5	25·2
Margarine	12·9	9·2	8·4	7·9
Lard	8·6	8·2	9·1	9·1
Total Fats ...	39·3	39·2	41·0	42·2
Eggs	...	150	149	152

COMMODITY	1929	1932	1933
Beef and Veal	70	64	63
Mutton and Lamb	28	31	34
Pig Meat	40	49	48
Total Meats ...	138	144	145

These figures and other matter contained in these pages provide a good deal of food for thinking for those of us who always enthusiastically advocate State intervention.

[1] *World Economic Survey, 1934–35*, page 89. League of Nations.

THE RAMAN-KRISHNAN THEORY OF THE REFRACTIVITY OF LIQUIDS

BY

S. SATHYANARAYAN RAO AND M. QURESHI

1. The Polarisation field in Liquids

THE problem of the evaluation of the actual optical or electrical field acting on a molecule in liquids is extremely recondite. Recently Darwin[1] has discussed some of the pitfalls of usual methods. He remarks that our average of the actual field may vary from E (he calls it the pipe force, by which we mean the force in a cavity cut along the lines of force in the refracting medium) to a value which may be many times greater than the Lorentz force, according as the points taken are in the atom or very remote from it. It is thus the average of a quantity that may vary through a very wide range, and hence it is possible to arrive at any value of the field depending on the method of average used. He has evaluated this field for spherical atoms by a method wholly different from that of Lorentz. He finds that it is the Lorentz force that is effective, and he says that this is quite independent of the shape of the molecule. He remarks, 'It should be noted that though we have used spherical atoms, the justification for the Lorentz force does not depend on this shape. It is the existence of an envelope to the molecule that matters, and this envelope may be of any form provided that there are equal number orientated in all directions.' To prove this he starts with the Lorentz cavity. He fills it with molecules and then evaluates the field due to the doublets whose upper boundary is the surface of the sphere and the lower the surface of the molecule.

If we assume that the atoms are polarised in the x-direction with a moment p and calculate the field at the origin due to a doublet at x, y, z, we get

$$X = \mu \frac{\delta^2}{\delta x^2}\left(\frac{1}{r}\right) = \frac{-\mu}{r^3} + \frac{3\mu x^2}{r^5}$$

$$Y = \mu \frac{\delta^2}{\delta x \delta y}\left(\frac{1}{r}\right) = \frac{-3\mu xy}{r^5}$$

$$Z = \mu \frac{\delta^2}{\delta x \delta z}\left(\frac{1}{r}\right) = \frac{-3\mu xz}{r^5}.$$

The field due to all the doublets will be ΣX, ΣY, ΣZ in the respective directions. If there are equal numbers orientated in all directions and the liquid as a whole is isotropic it has been proved by Darwin that ΣX vanishes. Obviously ΣY and ΣZ should also vanish as the three planes of reference are also planes of symmetry. This argument holds even if the upper surface is not a sphere. It is only required that there should be equal numbers orientated in all directions and the liquid should be isotropic.

It is important to note that Darwin's analysis consists of two parts. In the first he has taken various orientations of the molecules and evaluated *the average of the actual field* acting on any one. This really emphasises the fact that the Lorentz force is only an average. The second part seems to indicate that the Lorentz force is the actual force and that it is independent of the shape of the molecule.

It may be remarked at the outset that it is not inconsistent with the principle of 'Mean Values',[2] as enunciated by Lorentz to assume that the cavity is ellipsoidal provided it is such as to be large compared to molecular dimensions and small compared to the wave length of light. It is in fact more in accord with experimental evidence from light scattering to assume an ellipsoidal cavity as it takes cognisance of the anisotropy of the field, the existence of which was first pointed out by Raman and

Krishnan[3] on the basis of certain persistent discrepancies between the observed and calculated values for the depolarisation of the transversely scattered light, the refractive index, the di-electric constant, and the Kerr and Cotton-Mouton constants for liquids. Born in his Optik has also suggested the existence of such an anisotropic field. He has, however, remarked that we cannot make any assumption regarding the lengths of the axis. Now, assuming the existence of anisotropy, the field will depend on the orientation of the axes of the Ellipsoid with respect to the incident Electric vector. (It will be $p_1 P_x$, $p_2 P_y$, $p_3 P_z$ along the three axes where $p_1 + p_2 + p_3 = 4\pi$ and P_x, P_y, P_z are the components of mean polarisation per unit volume.) If we now fill in the ellipsoid with molecules, we can prove in a manner similar to Darwin that the field due to this, assuming that there are equal number orientated in all directions and the liquid is isotropic, is zero at the origin. The latter assumption is justified by the fact that the ellipsoid we have chosen is sufficiently large to contain a large number of molecules. There is nothing in the proof of Darwin to invalidate its application to a system of doublets between any two surfaces provided his fundamental assumptions are satisfied. If we now average this field for various orientations it is obviously equal to $\frac{4\pi P}{3}$ which is the value for the Lorentz field. It is to be remembered that the method of Lorentz is essentially a device to find the average of the actual field. Hence we believe that the usual value assigned to the polarisation field in liquids is not really the actual field acting on any molecule but the average taken for all the molecules in the liquid.

Now the question that naturally arises is this—in what way is this ellipsoid related to the ellipsoid which defines the effective space of the molecule? The calculations given in the subsequent section will show that the simple picture suggested by Raman and Krishnan[4] that the axes of the ellipsoidal cavity should be proportional to the axes of the 'effective ellipsoid' of the molecule is not far from the correct one. This assumption is tantamount to treating the distribution of matter immediately surrounding the molecules as continuous, which at least in dense media seems to be a fact.

2. Experimental evidence for the anisotropy of the field and its relation to molecular form

It is well known that though the depolarisation of the transversely scattered light in liquids is very much greater than in gases, it is not as much as it should be on the assumption of anisotropic polarisation field. In fact, the theoretical values for liquids derived from the values for gases on the basis of the Lorentz field are about three times the actual values. On the other hand, the values deduced from the basis of an anisotropic polarisation field are in very striking agreement with the observed ones. The following table is taken from a paper by Raman and Krishnan. [5]

TABLE I

Substance.	a in A.U.	$b=c$ in A.U.	r gas	r calculated from Isotropic Polarisation field.	r calculated from Anisotropic Polarisation field.	r liquid observed.
Pentane.	8·7	4·9	·0136	·21	·074	·075
Hexane.	10	,,	·015	·31	·087	·100
Heptane.	11·3	,,	·0153	·38	·083	·100
Octane.	12·6	,,	·0186	·46	·105	·129

The constants of the polarisation field in the above were calculated on the assumption that the molecule considered is at the centre of an ellipsoidal cavity scooped out of an otherwise uniformly polarised medium. The smaller axes were computed from the X-ray diffraction patterns of the paraffins in the liquid state. The larger axis was computed by assuming that the average volume occupied by a molecule $^1 = ab^2 = \frac{1}{n}$ where n is the number of molecules per unit volume. Stewart and his collaborators [5] have shown that in the case of alcohols where the diffraction peaks corresponding to both the dimensions of the molecule are obtained, the above formula leads to values of densities to within one or two per cent of the actual ones. The formula [6] used to evaluate the constants were

$$p_1 = 4\pi \left(\frac{1}{e^2} - 1\right)\left(\frac{1}{2e}\log\frac{1+e}{1-e} - \frac{1}{}\right)$$

$$p_2 = p_3 = 2\pi \left(\frac{1}{e^2} - \frac{1-e^2}{2e^3}\log\frac{1+e}{1-e}\right)$$

where e is the eccentricity of the ellipsoid defined by the relation

$$b = c = a\sqrt{1-e^2}.$$

It is obvious that we can reverse the above process. Assuming the presence of the 'anisotropy' of the polarisation field as an experimental fact we can calculate from depolarisation measurements of the transversely scattered light the constants of the polarisation field. This method has been adopted by Raman and Krishnan, and Krishnan and Ramachander Rao [7] in a series of papers. These have been calculated at various temperatures and given in a tabular form. They have also been calculated from the X-ray diffraction patterns of those liquids at 30° C. The change of these patterns with temperature has been envisaged in the following manner by Prof. Raman. At low temperatures the density of packing round a given molecule is so great that the 'Wirkung raume' i.e. effective space, in which it is embedded is in general of the same shape as the molecule. As the temperature is raised, if we assume the effective space to be ellipsoidal with semi-axes a, b, c, $(a > b > c)$ then c increases till it becomes equal to b. After that both b and c increase till they become equal to a. Then a, b, c all increase. The temperature at which $a = b = c$ is also the temperature at which the Lorentz force begins to hold rigorously. For pentane the values of the smaller axes deduced on this basis and those taken from X-ray measurements at various temperatures are given for comparison.

TABLE II

Temp.	From Prof. Raman's method.	Temp.	From X-ray measurements.
30	—	30	4·9
80	5·14	90	5·0
100	5·37	120	5·22

For paraffins in the solid state the formula $L_{\text{sol.}} = 1{\cdot}25n + 2{\cdot}3$ is found to express very accurately the length of the molecule. In the liquid state it is found that $L_{\text{liq.}} = 1{\cdot}24n + 2{\cdot}7$ expresses very accurately the corresponding length. Here n corresponds to the number of carbon atoms present. It is obvious that for moderate values of n both the above expressions are identical showing the correctness of the idea even if

there is a change of state. The agreement in the last two columns is striking. Similarly the anisotropic polarisation field reduces the excessive values for the Kerr and Cotton-Mouton constants given by the Lorentz field, to the figures which are in close agreement with experimental values. As an alternative explanation it may be suggested that some kind of grouping of the molecules in the liquid takes place in such a manner as to diminish their optical anisotropy. But, as has been pointed out by Raman and Krishnan, such a hypothesis is difficult to sustain, particularly when it is noticed that the apparent diminution of optical anisotropy is as marked in 'non associated' liquids like paraffins, as in others which are typically 'associated' like the alcohols.

The polarisation field constants for some liquids calculated from X-ray diffraction and light scattering are given below :—

TABLE III

Pentane.

Temp.	Density.	a in A.U.	$b=c$ in A.U.	From scattering		From columns 3 & 4	
				p_1	$p_2=p_3$	p_1	$p_2=p_3$
30	·6164	8·03	4·9	2·6	5	2·7	5·0
60	·5851	8·03	5·03	3·3	4·7	2·8	4·8
80	·5623	8·03	5·14	3·6	4·5	2·8	4·9
100	·5323	8·03	5·37	3·8	4·4	3·0	4·9
Hexane.							
30	·6504	9·1	4·9	2·6	5·0	2·4	5·1
50	·6318	9·1	5·0	2·7	4·9	2·4	5·1

Hexane

Temp.	Density.	a in A.U.	$b=c$ in A.U.	From scattering		From columns 3 & 4.	
				p_1	$p_2=p_3$	p_1	$p_2=p_3$
80	·6021	9·1	5·1	2·8	4·9	2·5	5·1
100	·5685	9·1	5·2	3·0	4·8	2·6	5·0
Octane.							
30	·6940	11·3	4·9	2·0	5·3	1·9	5·4
60	·6688	11·3	5·0	2·0	5·3	1·9	5·4
120	·6169	11·3	5·2	2·0	5·3	2·0	5·3

Krishnan and Ramachander Rao[7] who have investigated the temperature effect on the constants also get almost the same values for p_1, as those given in the above table. The agreement in the values of p_1 and p_2 calculated from the scattering and X-ray data is fairly good.

3. The Theory of Refractivity of Liquids

Using the concept of the anisotropic polarisation field Raman and Krishnan[3] have deduced the following expression connecting the refractive index of a substance with its density and optical anisotropy.

$$\frac{n^2-1}{n^2+2}\cdot\frac{1}{\nu}=\frac{c}{1-\nu\phi}$$

where $c=\frac{4\pi}{3}\cdot\frac{1}{3}(b_1+b_2+b_3)$

$$\phi=\frac{1}{3}(b_1\sigma_1+b_2\sigma_2+b_3\sigma_3)$$

$$\left[p_1=\frac{4\pi}{3}+\sigma_1,\ p_2=\frac{4\pi}{3}+\sigma_2,\ p_3=\frac{4\pi}{3}+\sigma_3 \text{ and } \sigma_1+\sigma_2+\sigma_3=0\right]$$

b_1, b_2, b_3 are the moments induced along the three optical axes of the molecule, and ν is the number of molecules per unit volume.

Any theory of refraction must explain the variation of refractive index with temperature. The values of refractive indices of some liquids calculated on the basis of the Lorentz and Raman and Krishnan formulae are given in table IV together with the experimental values. The constants of the polarisation field employed in this calculation are those obtained by the method of light scattering (see table III) as this method makes no assumption regarding the origin of anisotropy but merely assumes this as an experimental fact.

The method of calculation is briefly described below:

$$r\,(\text{depolarisation in liquids})=\frac{2nF}{kT\beta\left(\frac{\mu^2-1}{4\pi}\right)^2+n\frac{7}{3}F}.$$

where n = number of molecules per cubic centimetre.
k = Boltzmann constant
T = Absolute temperature
β = Iso-thermal compressibility
μ = Refractive index

$$F=\frac{1}{30}[(A'-B')^2+(B'-C')^2+(C'-A')^2]$$

$A'=b_1(1+p_1x)$
$B'=b_2(1+p_2x)$
$C'=b_3(1+p_3x)$

b_1, b_2, b_3 are the moments induced by unit field of light wave acting along the three optic axes of the molecule.

x = mean moment $=\frac{\mu^2-1}{4\pi}$.

In the case of paraffins if we take b_1 to correspond to the long axis of the molecules, owing to its being an axis of symmetry

$b_2=b_3$ and $p_2=p_3$

b_1 and b_2 can readily be calculated from depolarisation in the vapour state and the known refractivity at zero degrees and 760 mm.

$$\frac{n}{vap}-1=2\pi n\left(\frac{b_1+2b_2}{3}\right)$$

$$\frac{2(b_1-b_2)^2}{(b_1+2b_2)^2}=\frac{10r_{vap}}{6-7r}$$

from which using the relation $p_1+2p_2=4\pi$, p_1 and p_2 can be calculated.

The values for depolarisation in the liquid state at various temperatures have been taken from Ramachander Rao's[8] work. The data for refractivity have been taken from Eykman's Researches refractometriques, for pentane the value has been taken from Landolt and Bornstein's tables.

TABLE IV

Substance.	Temp.	Density.	Refractive index observed for H.	Calculated from Lorentz formula.	Calculated from Raman-Krishnan theory.
Pentane Liq. ...	73·1	·6315	1·36057*	...	...
Pentane Vap. ...	0·0	103 × 3·21	1·001711	1·001687	1·001704
Hexane Liq.	14	·6652	1·38365	....	...
Hexane Liq. ...	44·95	·6365	1·36635	1·3651	1·3670
Octane Liq. ...	20·6	·7019	1·39599	...	...
Octane Liq. ...	81·1	·6527	1·3667	1·3649	1·3660

It is clear from the above that the values calculated on the basis of Raman-Krishnan formula are in much better agreement with the experimental values than those calculated on the basis of the Lorentz expression.

4. Variation with Temperature

We shall now proceed to evaluate the variation with temperature for one liquid namely hexane. On differentiating the standard equation we have

$$\left(\frac{dn}{dt}\right)_{R.K.} = -\frac{(n^2-1)(n^2+2)}{6n}\cdot\frac{\alpha - \nu\frac{d\phi}{dt}}{1-\nu\phi} = R \text{ (say)}$$

in place of

$$\left(\frac{dn}{dt}\right)_{L} = -\frac{(n^2-1)(n^2+2)\alpha}{6n} = L \text{ (say) where}$$

α is defined by $-\frac{1}{\nu}\frac{d\nu}{dt}$.

We shall adopt a method which shall show the relative importance of the different terms of the correction introduced in the new theory.

$$|L - R| = \left|L\nu\phi - N\nu\frac{d\phi}{dt} - N\nu^2\phi\frac{d\phi}{dt}\right| \text{ where}$$

$N = \frac{L}{\alpha}$ and $\frac{1}{1-\nu\phi}$ is replaced by $1+\nu\phi$.

It is found that the second member contributes the greatest correction. To evaluate $\frac{d\sigma_1}{dt}$ we require to know the constants of the polarisation field at some other temperature. Using the values at 50 from Table III we find $\frac{d\sigma_{11}}{dt} = \cdot 01$.

and $\left|N\nu\frac{d\phi}{dt}\right| = \cdot 270$.

* Here Refractive index refers to sodium line *D*.

$$\left| N\nu^2\phi \frac{d}{dt} \right| = \cdot 02 \times 10^{-4}.$$

also $\left| L\nu\phi \right| = \cdot 07 \times 10^{-4}.$

$\left| L - R \right| = \cdot 320 \times 10^{-4}.$

Hence $R = 5\cdot536 \times 10^{-4}.$

$-L \times 10^4$	$-R \times 10^4$	-0×10^4
5·857	5·536	5·494

It is clear from the above that there is a very good agreement between the second and the third columns.

Conclusion

The principle of the anisotropic polarisation field has already been used by Raman and Krishnan with success in interpreting many optical and electrical phenomena. The values deduced by them are certainly more in accord with experimental results than those from other theories so far known.

Summary

The concept of the anisotropic polarisation field first introduced by Raman and Krishnan has been examined in the light of the points raised by Darwin in the paper mentioned above. It has been pointed out the expression $\frac{4\pi P}{3}$ ascribed to the polarisation field in liquids is only applicable to those liquids whose molecules may be considered as spherical. In the case of those possessing molecules of high assymetry there is bound to be deviation from the above if we consider the actual field acting on any molecule. It is the average of all such fields that is equal to $\frac{4\pi P}{3}$. The remark of Darwin that the Lorentz force does not depend on the molecular form refers only to the average field.

The constants of the polarisation field have been evaluated form measurements of depolarisation of the transversely scattered light and the shape of the cavity. A good agreement is indicated.

The refractive index of pentane in the vapour state and of hexane and octane in the liquid state have been calculated on the basis of both the Lorentz and Raman-Krishnan formulae. The values calculated on the basis of the latter are found to be in striking agreement with the observed values.

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SOME OF THE MOST IMPORTANT TIMBER-YIELDING TREES AND SHRUBS OF H. E. H. THE NIZAM'S DOMINIONS—HYDERABAD DECCAN

BY

M. SAYEEDUDDIN

INTRODUCTION

THIS article deals with some of the most important timber-yielding trees and shrubs found in H. E. H. the Nizam's Dominions, and has been prompted by the many enquiries which are constantly being received in this regard. The author has already placed on record some of the other timber-yielding trees and shrubs, endemic or naturalized in Hyderabad, in his previous Papers (see References), which might also be referred to in order to obtain fuller information. To avoid repetition neither systematic descriptions nor plates are given, for it is proposed to publish an illustrated flora of Hyderabad in the near future. Besides the trees and shrubs mentioned in this list there are others of less importance from the point of view of their timber value, and hence they have been omitted.

I am thankful to my Systematic Assistants, Messrs. M. Abdus Salam and M. R. Suxena for their assistance in the field as well as for the general help they have rendered in classifying the material.

I. Dilleniaceae

1. *Dillenia pentagyna* Roxb., *H.F.B.I.*, Vol. I, 38.
   Vern. Names: Kalinga, Rath-eggi (Tel.).
   Habitat: Pakhal Reserve. Partridge mentions that it is found in Mahadeopur Reserve and in the Godavery Forest.
   Flowers June to July. Fruit ripens in winter.
   Quality of Wood: The wood which is of a reddish-grey colour is rough, moderately hard, and is apt to split, warp and crack. Average weight per c. ft. is 47¼ lbs.
   Uses: It is very little used except for making charcoal which is very good.

II. Anonaceae

2. *Polyalthia cerasoides* Benth. and Hooker, *H.F.B.I.*, Vol. I., 63.
   Vern. Names: Gutti, Chilka-dudi, Tella-chilkadudi (Tel.).
   Habitat: Found in most forests in the Telangana districts.
   Flowers February to May.
   Quality of Wood: The wood is of an olive-grey colour, moderately hard and close-grained. Weight about 52 lbs. per c. ft.
   Uses: It is used in making posts of country houses, and also in making various implements.

3. *Saccopetalum tomentosum* H. F. and Thoms., *H.F.B.I.*, Vol. I, 88.
Vern. Names: Kari, Hum (Hind. and Mar.); Chilka-dudi, Nalla-chilka-dudi, Bara-dudi (Tel.); Hessare (Kan.).
Habitat: Common throughout the Telangana forests.
Quality of Wood: Wood is yellow or olive-brown, moderately hard, close-grained, and smooth; no heart wood.
Uses: It is very much utilized in making huts etc.

III. Capparidaceae

4. *Crateva religiosa* Forst., *H.F.B.I.*, Vol. I, 172.
Vern. Names: Barna, biliana (Hind.); Nirvala (Mar.); Narave (Kan.); Uskia-man, Urimidi (Tel.); Maralingam (Tam.).
Habitat: Found at Mahadeopur on the edges of the forest, on tank-bunds, and near villages. Planted elsewhere on road-sides, and in compounds of houses.
Flowers during summer.
Quality of Wood: Wood is yellowish-white, turning light brown when old, even-grained, moderately hard, but not every durable. It is liable to the attacks of boring beetles.
Uses: Much used in making models, drums etc., and in turning.

IV. Bixaceae

5. *Flacourtia Ramontchi* L'Herit., *H.F.B.I.*, Vol. I, 193.
Vern. Names: Muli-elka, Kan-regu (Tel.); Binka, Kuki (Mar.).
Habitat: A very common tree throughout the Hyderabad forests.
Flowers March to April. Fruit May to June.
Quality of Wood: Wood is red, hard, close-grained, splits but does not warp, and is durable.
Uses: Largely used for turning and for making agricultural implements.

V. Pittosporaceae

6. *Pittosporum floribundum* W. & A., *H.F.B.I.*, Vol. I, 199.
Vern. Name: Yerkaddi (Mar.).
Habitat: In Aurangabad only, sometimes found in the Ghat jungles.
Flowers January to June.
Quality of Wood: Wood is close-grained, strong and tough, moderately hard.
Uses: It is used only for fuel.

VI. Sterculiaceae

7. *Eriolaena Hookeriana* W. & A., *H.F.B.I.*, Vol. I, 370.
Vern. Names: Botku, Nar-Cotku (Tel.).
Habitat: Common in the Nandair forests and elsewhere.
Flowers in the rainy season.
Quality of Wood: Wood is of light red colour, strong, hard, tough and elastic.
Uses: Very much valued for ploughs.

VII. Rutaceae

8. *Limonia acidissima* L., *H.F.B.I.*, Vol. I, 507.
Vern. Names: Tora-elka, Tora-yelli-ka (Tel.).
Habitat: A common tree in most forests.
Flowers April to May. Fruit in Winter.
Quality of Wood: Very hard, like box-wood, yellowish-white, often darker in the centre.
Uses: It makes a good fuel, and is used in making rice-pounders, and the axles of oil-presses. Gamble rightly suggests its more extended use.

9. *Atalantia monophylla* Correa., *H.F.B.I.*, Vol. I, 511.
Vern. Names: Makur limbu (Mar.); Advi Nima Kai (Tel.).
Habitat: Throughout the Telangana forests along water courses and in damp places.
Flowers October—December.
Quality of Wood: Wood is of a yellow colour, is very hard and close-grained.
Uses: Gamble recommends it to be used as a substitute for box-wood, and for cabinet-making and turning.

VIII. Anacardiaceae

10. *Odina Wodier* Roxb., *H.F.B.I.*, Vol. II, 29.
Vern. Names: Ginjan (Hind.); Kamlai (Pb.); Godda (Kan.); Gumpini, Dumpidi (Tel.); Shinti, Magir (Mar.).
Habitat: Very common in all forests, especially associated with *Boswellia serrata*.
Flowers February to April.
Quality of Wood: Moderately hard, close-grained, light red when freshly cut, turning darker on exposure. Weight is 50—60 lbs. per c. ft. It is difficult to season, but once well seasoned it is quite useful.
Uses: Seasoned wood is used for cabinet-making. Unseasoned wood is used for making rice-pounders, oil-presses, spear handles and sword sheaths, etc.

IX. Leguminosae

11. *Ougenia dalbergioides* Benth., *H.F.B.I.*, Vol. II, 161.
Vern. Names: Sandan (Hind.); Dargu, Tella-modgu, Kodi-mudsu (Tel.); Tiwas, Tunuz (Mar.).
Habitat: Common towards Ajanta Hills in Aurangabad.
Flowers February—May.
Quality of Wood: Weight of wood about 55 lbs. per c. ft. It is hard and close-grained, strong and tough.
Uses: It is particularly suitable for carriage-building and for making agricultural implements. It also makes very good furniture.

12. *Pterocarpus Marsupium* Roxb., *H.F.B.I.*, Vol. II, 239.
Vern. Names: Bija Sal (Hind.); Pedda-eggi, Pedda-eggashi (Tel.); Bibla (Mar.).
Habitat: Common in the Pakhal and the surrounding Reserve Forests.
Flowers in the beginning of the rains, about the month of July.

Quality of Wood: Wood is very hard and close-grained. Average weight about 53 lbs. per c. ft. It is next to teak as regards its durability. It seasons well and takes on a fine polish.
Uses: Utilized for Railway-sleepers, for door-frames, posts, beams, agricultural implements, and also for furniture.

13. *Bauhinia racemosa* Lam., *H.F.B.I.*, Vol. II, 276.
Vern. Names: Mawal (Hind.); Arvi (Tel.); Apta (Mar.).
Habitat: Common in all the forests.
Flowers in summer.
Quality of Wood: The tree never attains a good size. Weight of wood is about 46 lbs. per c. ft.
Uses: Used only for fuel.

14. *Bauhinia malabarica* Roxb., *H.F.B.I.*, Vol. II, 277.
Vern. Names: Pedda-ari, Pul-chinta, Pul-dondra (Tel.); Vatta Atthi (Tam.); Aram Puli (Mal.).
Habitat: Commoner in the moister forests than in the drier forests.
Flowers September—January.
Quality of Wood: Rather of a poor quality. Weight 46 lbs. per c. ft.
Uses: Good enough only for fuel.

15. *Xylia dolabriformis* Benth., *H.F.B.I.*, Vol. II, 286.
(The Iron-wood Tree of Pegu and Arracan).
Vern. Names: Boja, Tangedu, Penanged (Tel.); Jamba (Mar.); Irul (Tam.).
Habitat: Common in many parts, especially along the Godavery.
Flowers March to April.
Quality of Wood: The heart-wood is dark-brown or reddish brown, extremely hard and close-grained. Average weight is 60 lbs. per c. ft.
Uses: Mostly used for making agricultural implements, house-posts, carts, and tool handles, etc. It is useless for furniture, because it is so weighty and hard that it is difficult to drive nails into it.

16. *Prosopsis spicigera* Linn., *H.F.B.I.*, Vol. II, 288.
Vern. Names: Jand (Pb.); Jhand (Hind.); Jammi, Jambi (Tel.); Sumri, Saunder (Mar.); Banni (Kan.).
Habitat: A common tree in open places, on black cotton soil or stony ground.
Flowers February—April.
Quality of Wood: Weight of wood is about 58 lbs. per c. ft. It is very hard, but liable to dry-rot, and readily eaten by insects.
Uses: It is an excellent fuel.

17. *Mimosa rubicaulis* Linn., *H.F.B.I.*, Vol. II, 291.
Vern. Names: Aila (Hind.); Vundra, Undrug (Tel.).
Habitat: Common in all forests.
Flowers during the rains.
Quality of Wood: Being a shurb it does not attain any good size to be useful in furniture.
Uses: It is chiefly used for charcoal for gunpowder.

18. *Albizzia procera* Benth., *H.F.B.I.*, Vol. II, 299.
The 'White Siris'.
Vern. Names: Safed Siris (Hind.); Pasarganni, Pachardu, Tella-chinduku (Tel.); Vagati (Tam.); Sirsi, Uriya (Mar.).
Habitat: A fairly common and very conspicuous tree in moist forests.
Flowers May to August.

Quality of Wood: Heat-wood is durable, even-grained, brown, shining, with alternate belts of darker and lighter colour.

Uses: It is used for making agricultural implements, house-posts, wheels, etc.

X. Combretaceae

19. *Anogeissus acuminata* Wall., *H.F.B.I.*, Vol. II, 450.
Vern. Names: Pasi, Pashi, Bu-chakram (Tel.).
Habitat: Quite a common tree in the Godavery forests, chiefly near streams, and river-banks, associated with *Eugenia jambolana*, (Jamun) and *Terminalia Arjuna* (Arjun, Tellamaddi).
Flowers February to March.
Quality of Wood: The wood is of a grey or greenish-grey colour. Its weight is 50 lbs. per c. ft.
Uses: If kept dry it is strong and durable, and fit enough for house-building.

20. *Gyrocarpus Jacquini* Roxb., *H.F.B.I.*, Vol. 11, 461.
Vern. Names: Kumar-punki, Punki (Tel.).
Habitat: Common in the Telangana forests on rocky, dry hills.
Flowers February to March.
Quality of Wood: Weight of the wood is about 22 lbs. per c. ft. It is very light, soft, and white. It takes paint very well.
Uses: Much used for making small boxes and toys which are covered with lacquer.

XI. Melastomaceae

21. *Memecylon edule* Roxb., *H.F.B.I.*, Vol. II, 563.
Vern. Name; Alli (Tel.).
Habitat: It is a common tree throughout the Godavery forests, generally along streams.
Flowers in winter.
Quality of Wood: The wood is of a light brown colour, very hard and close-grained.
Uses: It makes an excellent fuel and charcoal, also used for making house-posts.

XII. Oleaceae

22. *Shrebera swieteniodes* Roxb., *H.F.B.I.*, Vol. III, 604.
Vern. Names: Mokha (Hind.); Mokhab (Tel.); Kalgante (Kan.); Mogalinga (Tam.).
Habitat: Found throughout the Telangana forests, but not quite common or plentiful.
Flowers February to April.
Quality of Wood: Wood is of a brownish-grey colour, is hard, close-grained, and durable.
Uses: It is used for beams, weaving-looms etc.

XIII. Boraginaceae

23. *Cordia Macleodii* Hook. F. & Thoms., *H.F.B.I.*, Vol. IV, 139.
Vern. Names: Dhaiman, Dhagan, the latter name is used for *C. Rothii* also; Gonni (Hind.); Iriki (Tel.).

Habitat: Common enough in the forests along the Godavery, also met with in some of the Telangana forests.
Quality of Wood: The wood approaches teak in its qualities, being even-grained, and very hard. It is light brown and beautifully mottled with darker veins.
Uses: It is well suited for making furniture, cabinets, and for other ornamental work.

XIV. Bignoniaceae

24. *Heterophragma Roxburghii* DC., *H.F.B.I.*, Vol. IV, 381.
Vern. Names: Kapa-gargu, Kala-goru, Baray-kalikod, Bondugu (Tel.); Waras, Warsi (Mar.).
Habitat: Fairly common in all the Telangana forests, and especially along the Godavery.
Flowers in summer.
Quality of Wood: Average weight is 40 lbs. per c. ft. It is grey, moderately hard, tough and durable.
Uses: It is suitable for beams and planks.

XV. Verbenaceae

25. *Gmelina arborea* Linn., *H.F.B.I.*, Vol. IV, 581.
Vern. Names: Gumar-tek (Hind.); Gumudu, Gumudu-teku, Pedda Gumudu (Tel.); Shiwan, Siwan (Mar.).
Habitat: Found throughout the dominions, but not common.
Flowers March to April.
Quality of Wood: Average weight is 36 lbs. per c. ft. It is yellowish, greyish, or reddish-white, with a glossy lustre, even-grained, soft, light, strong and durable. It is an excellent timber, but is not available in large quantities.
Uses: It can be utilized for making furniture, doors, carriages, boxes etc.

XVI. Euphorbiaceae

26. *Givotia rottleriformis* Griff., *H.F.B.I.*, Vol. V, 395.
Vern. Names: Punki, Tella-punki (Tel.); Polki (Mar.); Vendule (Tam.).
Habitat: Common enough in most of the Telangana forests.
Flowers in summer.
Quality of Wood: Wood is white and exceedingly light, but fairly durable. Average weight is 14 lbs. per c. ft.
Uses: It is largely used for making toys, trays, carved figures, and imitation fruits.

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AL-FARABI ON THE STUDY OF PHILOSOPHY

BY

MUTAZID WALI-UR-REHMAN, M.A.

(Dept. of Philosophy)

OF all the philosophers—and especially the Muslim philosophers—of the middle ages a'l-Fârâbî is perhaps the only one who has exaggerated the greatness of Aristotle, as a teacher and a promulgator of philosophical knowledge, to the extent of regarding him a veritable prophet in the realm of intellectual speculation. Every word that has slipped from the pen of Aristotle carries a weight which is much more than that of all the books that the other thinkers have taken pains to produce. This attitude of the Muslim thinker is not without its advantages. Its has been the cause of a thorough study of Aristotle, who might otherwise have remained quite obscure in many respects. Many problems that could have been regarded as insignificant, and hence thrown away as unworthy of being attended to, have been brought to light by the over-zealous Muslim disciple. Thus in a small treatise a'l-Fârâbî has very compactly brought together some very important hints for the study of Philosophy scattered in different works of Aristotle. At first sight these hints look rather trivial, but they are in reality worthy of a careful and diligent study.

A'l-Fârâbî thinks that there are certain things that a serious student of Philosophy should thoroughly know before he begins his study of Philosophy. These important things he has culled from the writings of Aristotle, and collected them in one of his small treatises[1]. He has divided this requisite knowledge into nine broad heads, and then briefly explained every one of them with comments wherever necessary. These nine heads are as follows :—

I. The sects and the schools of Philosophy.
II. A knowledge of the purpose of Aristotle in writing his various books.
III. A knowledge of the science that should precede the study of Philosophy proper.
IV. A knowledge of the aims and the objects of the study of Philosophy.
V. A knowledge of the way the student of Philosophy should choose.
VI. A knowledge of Aristotle's mode of speech, and the use that he makes of it in his works.
VII. A knowledge of the reason for Aristotle's adopting the esoteric style in his works.
VIII. A knowledge of the condition and the state in which a philosopher should be.
IX. Things required by a man desiring to read the books of Aristotle.

Now we shall take them one by one, and try to see what a'l-Fârâbî means by them.

I. The Sects and the Schools of Philosophy

These sects and schools have been variously named. Generally speaking they have seven different sources :—

(1) They are sometimes named after the name of the philosopher, e.g., the Pythagoreans, or the Aristotelians.

(2) Sometimes they are named after the town, or the country from which the philosopher hails, e.g. the Ionians.

[1] The name of this treatise is :— ما ينبغي ان يقدم قبل تعلم الفلسفة — 'What one should know before one studies philosophy.'

(3) They are also known after the name of the place where the philosopher taught, e.g., the Stoics. They were so called because the founder of this school—Zeno[1]—taught in *Stoa Poecile*, the Painted Porch, in Athens. The word Stoic is an adjective from the Greek word *Stoa* meaning a porch.

(4) Sometimes they derive their names from the method and the character of the teacher, e.g., the Cynics, i.e. belonging to the sect founded by Antisthenes[2]. They are also known as Kunikos from the Greek word *Kuon*, meaning a dog. They were so called because this sect did not believe in love towards the relatives, or the brothers, or for the matter of that for any body else. This sect in short represents all the characteristics of a dog. In Arabic they are known as ' Kalabi ', i.e., those resembling, or having the characteristics of, a dog.

(5) Sometimes they are labelled according to the teachings of the founder, e.g., the nihilists.

(6) Sometimes they are classified according to the opinion of the teacher regarding the aim and the object of the study of Philosophy, e.g., the Epicureans[3], also called the Hedonists, for they taught that the sole aim of Philosophy was the acquisition of pleasure.

(7) Sometimes the movements and the gestures of the teacher during the teaching of Philosophy give their name to the sect, e.g., the Peripatetics, the followers of Aristotle. They were so called because Aristotle used to walk up and down the room while lecturing.[4]

II. A Knowledge of the Purpose of Aristotle in Writing his Various Books

The works of Aristotle can be divided into particular and general and those midway between the two. Those belonging to the former class deal with particular problems. The first two classes of his works comprise his treatises. Among the general class some are of the nature of notes to which Aristotle used to refer to refresh his knowledge, while others teach Philosophy. Out of those of the latter class, i.e. those that teach Philosophy, some deal with a particular school of Philosophy, and others with Philosophy in general. Then some of his books are concerned with speculative Philosophy and others with practical Philosophy. Then again some teach metaphysical, or physical, or pedagogical, problems. Out of those that deal with the physical problems, some discuss general problems common to all the natures, and others problems that are special to particular natures. The general problems common to all the natures are discussed in a book called *de Physica Auscultatione*. In this book Aristotle deals with the knowledge of the principles of all things, and of things which are, so to speak, the adjuncts to such things. Now the principles are examplified in the elements and forms and everything which resembles an element but is not in reality an element. The adjuncts to the principles are examplified in the void and the unlimited. Some of the books dealing with the problems special to particular natures discuss the knowledge of things that have no ' becoming ', and others impart the knowledge of things that ' become '. Out of the

[1] Zeno of Citium in Cyprus was the son of a family of merchants of Phoenician origin. On losing his fortune in a shipwreck he decided to indulge his taste in study. He was the disciple of various philosophers and ultimately taught in Stoa Poecile. Convinced of the rightness of suicide he put an end to his life in about 260, B.C.

[2] Antisthenes, an Athenian, was a disciple first of Gorgias, and then of Socrates. After the death of the latter philosopher, he taught in the gymnasium, called Cynosarges to which he was restricted, not being purely of Athenian extraction.

[3] Epicurus was born about 340, B.C. of Athenian parents. The study of Democritus and the reflection on his mother's superstitious practices made him sceptical. He believed that it was the business of Philosophy to make us happy. He died in 207, B.C.

[4] 'Al-Fârâbî wrongly includes Plato in this school. He thinks that Aristotle used to do this so that the body might also be active along with the mind.

former some are related to the general knowledge of all such things, while others to the special knowledge of these things. The general knowledge about things that 'become' is examplified in the transformation of motion. He discusses this transformation in his book on the *Cosmos and the Chaos*, and motion itself in two other treatises on *Heavens*. Among books dealing with the problems special to particular things some are special to simple natures and others special to compound natures. The former he discusses in his book known in Arabic as *Athâr-a'l-Alwiyyah*. Among the latter some are general and some are particular. The general things are dealt with in his book on *Animals*, and on *Plants*, and the particular things form the subject matter of his book on the *Sense and the Sensible*, and on *Soul*.

The pedagogical works of Aristotle are his books on *Scenes*, *Lines*, etc. Among the books dealing with practical Philosophy some discuss morals, others political economy, and still others domestic economy.

From amongst the books treating of the reasoning used in Philosophy, some are to be studied before the science of reasoning and others teach this very science. There are others that are to be gone through after the acquisition of the science of reasoning. Now, out of those that are to be studied before the science of reasoning, some deal with the parts of the conclusion to which a valid reasoning leads, and others with the parts of the premises which are used in the reasoning. The former topic is discussed in Aristotle's *Topics*, and the latter in the *Categories* which is concerned with terms.

The science of reasoning Aristotle teaches in his books on *Syllogism*. Some of these books deal with the figure in which the reasoning happens to fall, and others with the elements of the reasoning. The former topic is dealt with in his book known as *Analytics*, and the latter in the *Interpretations*. Now about those books which are to be studied after the acquisition of the science of reasoning. Some of these books differentiate between valid and invalid reasoning, others deal with error pure and simple, and still others with both truth and error. The invalid reasoning is error pure and simple. This he discusses in his *Art of Poetry*. The reasoning which is a mixture of truth and error can assume three forms:—(1) The truth is equal to the error, (2) The error is greater than the truth, (3) The truth is greater than the error. The first he discusses in the *Art of the Orators*, the second in his *Sophists*, and the third in his *Dialectics*.

III. The Science that should Precede the Study of Philosophy

Here there is a great difference of opinion among the thinkers, no two of them agreeing with each other. We can recall at least four different views:—

(1) The Platonists are of opinion that Geometry should precede Philosophy. They quote Plato himself, who is said to have put up an inscription over his school building, to the effect that none should dare enter the building who is not a geometrician. This conviction was based on the fact that the reasoning used in Geometry was of the most valid form.

(2) The followers of Theophrastus[1] think that the students of Philosophy should start with Ethics, because an immoral man is not competent to impart the right sort of knowledge. To support this opinion they quote Plato who is reported to have said that an unchaste man cannot approach a chaste man. They also quote Hippocrates who has laid down that an impure body aggravates its impurity every time it is fed.

(3) Boethus of Sidon opines that one should start with the science of temperaments, because it is this science alone that we can know best.

[1] He was a somewhat younger friend of Aristotle. It was with him that he founded his own school at Athens in 335, B.C. which had its seat in Lyceum, and was called the Peripatetic school. Theophrastus belonged to Erebus in Lesbos. He was born in 370, B.C. and died in 287, B.C.

(4) Andronicus[1], the disciple of Boethus, has it that Logic is the right science to start with, because it is by its help alone that one can discriminate between the truth and the falsehood of all the things.

Obviously out of all these four opinions no one is inferior to the other. No body will deny the fact that a pure soul and a moral self is a desideratum before one begins to have, or to give, his first lessons in Philosophy. It is very necessary that the passions of the mind should be what may be called virtuous. They should be real virtues like pleasure and love, and not the imaginary ones. This can only be attained through a thorough reformation of one's morals,—reformation which is the result of deeds and not of mere words. This also leads to the reformation of the rational mind, which is thus enabled to know the way of Truth. This knowledge saves it from falling into the dark abyss of falsehood and error. But this is possible only by a full grasp of the principles of reasoning. Now reasoning is of two kinds : the geometrical and the logical. Thus we come to the final conclusion that to begin with one should master so much of Geometry as will enable him to follow and understand the geometrical reasoning, and thus prepare him for the science of Logic.

IV. The Object of the Study of Philosophy

The only object of the study of Philosophy should be a full knowledge of the Creator, that He is One, Immovable, and the Efficient Cause of all the things, and that He has ordained and organised this world with His Munificence, Wisdom and Justice. The behaviour of the philosopher should be similar to that of the Creator, so far, of course, as lies in his power.

V. The Way that the Student of Philosophy should tread

The way that the student of Philosophy should tread should be that of the desire to act, and to reach the goal. The desire to act is possible only by knowledge, and the attainment of the goal in knowledge is impossible save by an acquaintance with (1) the temperaments and the natures, for they are easy to understand, and (2) Geometry. The attainment of the goal of conduct is possible first by a thorough reformation of one's own self, and then of others who come in contact with him, within his own house or city.

VI. The Style that Aristotle has adopted in his Works

Aristotle has adopted three different styles in his books. In his books written for the chosen few he is very brief and apparently paradoxical. In his commentaries he is very deep and difficult. In his treatises he very strictly follows the style which should be characteristic of treatises—he is very clear and brief.

VII. The Reason for his Esotericism

There are three main reasons why Aristotle has adopted the esoteric way of writing :—

(1) He wants to know whether the student is fit to receive lessons in Philosophy or not.

(2) He does not want to make Philosophy the common property of all the people, but of the deserving only.

(3) He likes to see the thinking self doing penance in the form of fatigue in search after Truth.

[1] Andronicus of Rhodes (60–50) produced the first complete edition of Aristotle's Works.

VIII. The State in which the Teacher of the 'Science of Aristotle' should be

This teacher, Aristotle thinks, should have all the attributes and the qualifications mentioned so far. This means that he should thoroughly reform his passionate self, so that these passions should lead to Right only and not to pleasure alone. In addition to this he should look after his rational self, so that all his volitions and intentions are rational. Aristotle has put it down that he should not love these volitions to the extent of choosing right alone, nor should he despise it to the extent of falsifying everything. The teacher should neither be very harsh and strict, nor very submissive and accommodating. The first creates a hatred in the minds of the pupils towards him, and the second becomes the cause of his being taken very lightly by the students, thereby making them dull and lazy. It is very necessary that the teacher should always be ready to accept everything that is new, and should follow his calling without a break. This makes his knowledge perfect and sound. But if he is always engaged in studying different kinds of knowledge, his mind becomes disorderly and disarranged.

IX. The Things that the Teacher needs

The teacher should have a perfect knowledge of :—

(1) The purpose of Aristotle's books on Logic.
(2) The advantages of his science.
(3) The reason of his giving various names to his works.
(4) The arrangement of his works.
(5) The validity of his works.
(6) The mode of speech that Aristotle adopts in his books.
(7) The parts into which he divides each and every one of his books.

Now the syllogism is composed of two things :—the premises, which are the component parts thereof, and the figure in which it happens to fall. This knowledge is gained from Aristotle's *Analytics*. The premises are again made up of terms, and their forms. These are the ulmate parts of speech. The genus of the simple things that we talk about adopts ten forms, every one of these forms referring to every one of the genera. This is discussed in his *Categories*. The forms of the premises are found in the second part of the *Analytics*, the premises themselves forming a part of his work on Reasoning. These are the very books that are to be gone through before studying Logic for they lead to the knowledge of the reason of writing each one of them. But if one wants to know the different chapters into which every one of his books is divided, he should master each and every one of the books mentioned above.

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