

How did East German genetics avoid Lysenkoism?

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Lysenkoism gained favour in the Soviet Union during the 1930s and 1940s, replacing mendelian genetics. Opponents of Lysenko were dismissed from their jobs, imprisoned and, not infrequently, died. After World War II in some of the East European Soviet satellite states, Lysenkoism became the official genetics supported by the communist authorities, and thus, genetics and biology were set back many years. Yet the uptake of Lysenkoism was not uniform in the Eastern Bloc. The former East Germany (GDR) mostly escaped its influence, owing to the contribution of a few brave individuals and the fact that the country had an open border with the West (West Berlin).

In the 1920s–1930s, Soviet genetics was part of the mainstream, and Russian geneticists were well known and respected internationally. However, at about the same time a ‘new’ genetics gained political influence in the USSR. Lysenko – together with the marxist philosopher Prezent – developed a theory contradicting mendelian genetics [1,2].

A central tenet of this ‘Michurinist Biology’ (Box 1) was the inheritance of acquired characters – an idea believed to be

in agreement with the communist ideology. This theory received official support from Stalin in 1936. Many distinguished geneticists who did not follow the political theories of stalinism and did not support Lysenkoism (e.g. Vavilov, Karpechenko, Levitsky, Agol, Levit, Nadson and Meiser) were caught by waves of arrests, often ending in their death [3,4].

After the war, Lysenko gave a notorious lecture on ‘The Situation in the Biological Science’ [5] during a conference of the Lenin Academy of Agricultural Sciences of the USSR (31 July to 7 August 1948, Moscow). At the closing session, Lysenko announced that the Central Committee of the Communist Party had examined and approved his lecture (Box 2). This marked the political victory of Lysenkoism and the beginning of the (almost) complete destruction of ‘normal’ genetics in the Soviet Union. Genetic institutes and laboratories were closed, geneticists were dismissed from their academic positions [3,4], and the whole school and university system was brought into line with Lysenkoistic concepts.

Lysenkoism reached its summit (and the beginning of its decline), when

Lysenko presented his ‘theory’ of the regular sudden transformation of species in 1949–1951 (Box 1).

The penetration of Lysenkoism into the GDR (East Germany)

It has to be remembered that during the Stalin era, the policies in the Eastern Bloc were dictated from Moscow, and so the 1948 Moscow conference and Lysenko’s approval by Stalin signalled the transfer of these concepts into all other communist countries. The influence of Lysenko’s ‘Michurinist Biology’ was strong in Bulgaria, Rumania, Hungary and Czechoslovakia – in both schools and universities. In these countries, the damage done by Lysenkoism to teaching and research in genetics and biology was severe and long lasting. However, the situation in other East European countries was rather different.

The authorities of GDR, under pressure from Moscow, actively distributed Lysenkoistic publications, and several scientists and propagandists accepted these concepts and promoted them in public. However, in the GDR, the Lysenko discussion was mainly political, not a

Box 1. Theses of Lysenko’s ‘Michurinist biology’

1935–1948

- (1) Inheritance is an attribute of the whole organism, not of discrete hereditary factors. Genes do not exist.
- (2) Changing the environment gives rise to new characters that are inherited (‘inheritance of acquired characters’). The type of the hereditary changes induced depends on the environmental influences.
- (3) Winter varieties of cereal (e.g. wheat), which normally require a period of cold treatment (of the imbibed kernels or seedlings), can be changed into spring forms without any cold treatment as a consequence of the changed environment.
- (4) Hybridization within (rather than between) varieties of cultivated plants leads to an increase of yield.
- (5) Plants can be heritably altered by grafting. Graft hybridization is analogous to sexual hybridization.
- (6) There is no difference in principle between sexual and graft hybridization.
- (7) By grafting, it is possible to cause a ‘vegetative convergence’ of the grafting partners. Therefore, it is possible to make crosses between grafted partners that could not be crossed sexually (the ‘Mentor method’).
- (8) After grafting of F1 hybrids as scions (stems), the segregation ratios in their progeny will be changed under the influence of the (root) stock, on which they had been grafted.
- (9) Classical genetics – dismissively called ‘Mendelism–Morganism–Weismannism’ by Lysenkoists –

is inconsistent with the philosophy of dialectical materialism (a cornerstone of Marxist theory). The title of a widely distributed book of Lysenkoistic authors was *Against the Reactionary Mendelism–Morganism*.

- (10) Mendel–Morgan genetics advocates the ‘monopoly of the nucleus’ for heredity (see point 1) [a–c].

1949–1951

Lysenko’s concept reached its summit (and the beginning of its decline) with the ‘Theory of sudden species transformation’. This stated that within cereals, a cultivated plant species is able to change suddenly into another cultivated species or into a related weed. Lysenko reported to have found a single rye grain in an ear of wheat, and claimed that plants of barley (*Hordeum vulgare*) suddenly form grains of the weed *Hordeum spontaneum*. His followers extended this ‘theory’ to other species.

References

- a Siemens, J. (1997) Lysenkoismus in Deutschland (1945–1965). *Biologie in unserer Zeit* 27, 255–262
- b Stubbe, H. (1982) *Geschichte des Institutes für Kulturpflanzenforschung Gatersleben der Deutschen Akademie der Wissenschaften zu Berlin 1943–1968*, Akademie-Verlag
- c Hudson, P.S. and Richens, R.H. (1946) *The New Genetics in the Soviet Union*, p. 88, Imperial Bureau of Plant Breeding and Genetics

genuine scientific debate. Lysenkoistic concepts never really took hold at all levels of society, nor did it damage East German genetics. The reasons for this are the subject of this article.

Before going into details, an important fact should be emphasized: from 1945 to 1961, the GDR had an open border with West Berlin. One could travel freely from East Berlin (Soviet sector) to West Berlin on the metro (subway), until the Berlin Wall was built in 1961. The supporters and the opponents of Lysenko, as well as the political authorities, realized that geneticists who were persecuted could simply leave.

Influence on schools

The Ministry for the Socialist Educational System was under strict political control of the communist authorities. Between 1952–1959, Lysenkoism was introduced into the school textbooks, and biology teachers received orders to deal with these topics in their lessons.

But the Lysenkoistic influence only lasted a few years. In 1954, Lysenko was criticized for dogmatism by the new Soviet communist party leader, Nikita Chruschev. This reduced Lysenkoistic influences in the GDR, and meant that Lysenkoistic ideas in school textbooks could be criticized by East German geneticists.

After the dismissal of Chruschev in 1964, Lysenkoism suddenly disappeared from East German school textbooks; soon textbooks were published that presented mendelian genetics [6].

The situation in East German universities

The influence of Lysenkoism in the universities was not uniform and depended on the local situation (for details, see Ref. [7]). Of course, the Ministry for Higher Education of the GDR tried to provide supporters of Lysenko with greater influence. However, in general these efforts were met with limited success.

The German Lysenkoists – when they were party members – often got ‘directions from the party’ (in German: *Parteiauftrag*) to support Lysenkoism. Some did this by conviction, because they believed in the old Lamarckian–Darwinian idea of inheritance of acquired characters (which was rather popular among biologists in Germany in the 1930s). Others had been in opposition to the Nazi racist ideology and expected Lysenkoism to provide new genetic thinking. And others were

Box 2. Important events

In the USSR

- 1936 T.D. Lysenko presents, supported by I.I. Present, the first version of the theses of his Michurinist Biology.
- 1936 Official support of Lysenko's concept by J.V. Stalin.
- 1936–1943 A wave of arrests of many distinguished geneticists, ending with their death (e.g. Vavilov, Karpechenko, Levitsky, Agol, Levit, Nadson, Meiser [7]).
- 31 July 1948 Lysenko's lecture on ‘The Situation in the Biological Science’ at the Conference of the Lenin Academy of Agricultural Sciences of the USSR in Moscow. Full political victory of Lysenkoism in the USSR following the announcement, ‘The Central Committee of the Communist Party has examined Lysenko's lecture and has approved it.’ [6]
- 1948 Beginning of the almost complete destruction of ‘normal genetics’ in the Soviet Union and start of the transmission of Lysenkoism to other communist countries.
- 5 March 1953 Death of J.V. Stalin; N.S. Chruschev becomes the new First Secretary of the Communist Party of USSR.
- 1964 Dismissal of N.S. Chruschev; L.I. Brezhnev becomes the new General Secretary of the Communist party of USSR.

In East Germany

- 1945–1949 Eastern part of Germany and East sector of Berlin are the ‘Soviet Occupied Zone’.
- October 7 1949 Foundation of the German Democratic Republic (GDR; or in German: *Deutsche Demokratische Republik*, DDR).
- 1945–1961 There was an open border between East Berlin (the Soviet sector) and West Berlin (the American, British and French sectors), including a metro service between the two parts of Berlin that was continued throughout this period.
- 13 August 1961 Building of the Berlin Wall; interruption of all uncontrolled traffic connections between the two parts of Berlin, and between East Germany (GDR) and West Germany (Bundesrepublik). The only exceptions were Western military traffic between West Germany and West Berlin, and air traffic between West Germany and West Berlin).

just opportunists who wanted to further their careers.

In many universities, lectures on genetics were discontinued for several years and replaced by lectures on ‘Creative Darwinism’ (a synonym of Lysenkoism). In the Friedrich Schiller University, Jena, there were two main proponents of Lysenkoism: Georg Schneider, who worked on developmental processes in amphibia in the thirties and forties in the Soviet Union, returned to East Germany after World War II and promoted Lysenkoistic concepts [7,8]. Schneider was supported by the plant taxonomist Otto Schwarz, who was rector of the University of Jena (1948–1951, 1958–1962). However, other professors at Jena (Wartenberg, Gersch, Drawert) held opposing views and distributed their views among students.

Another advocate of Lysenkoism was Jakob Segal, animal physiologist at the Humboldt University, East Berlin. Curiously, Segal published several of his articles as an appendix to the newspaper ‘Press of the Soviet Union’ as if his publications were part of or were requested by this journal – a particularly dubious method.

The Ernst Moritz Arndt University, Greifswald, had a strong Lysenkoistic influence [7]. The university had invited a Russian guest lecturer, A.F. Scheremetjev,

who gave regular lectures on Lysenkoism (1953–1955). Support of the Lysenkoistic ideas also came from Werner Rothmaler (nicknamed *Rouge Malheur* by both opponents and friends). He was a cultured, well-read man and a good speaker who was influential among students and young scientists. He promoted the Lysenkoistic ideas on inheritance of acquired characters and criticized the chromosome theory. However, as an experienced botanist he could not accept Lysenko's ideas on the sudden transformation of species, and criticized these ideas (in 1952–1953).

At some East German universities, Lysenkoists tried to apply pressure on students and young scientists to propagate their ideas. For example, when I was an undergraduate student at the University of Leipzig, the Associate Professor of Zoology, C.F. Werner, said in one of his lectures on zoology (1951), ‘I have the impression that some students in this lecture hall believe that it is their decision whether they accept the Michurinist Biology of Lysenko or rather hold onto Mendelism–Morganism. Those who are not willing to accept Lysenko's theories will have no scientific future here.’ One university in which there was practically no Lysenkoism was the Martin Luther University in Halle, because of the

influence of three individuals, Hans Stubbe, Gustav Becker and Kurt Mothes. Consequently, I contacted Stubbe and changed to the University in Halle, finally joining Stubbe's institute in Gatersleben.

Thus, at some universities, there was some pressure in favour of Lysenkoism; it could result in freezing of students and young scientists out of an institute or a university, or in slowing down their scientific career. But, in the GDR there were no charges, trials or sentences against established scientists who were opponents of Lysenko.

Opposition of Lysenkoism by German geneticists

Opponents of Lysenkoism whose institutes were in West Berlin (American, British, French sectors) could express their opinion without any risk (e.g. Hans Kappert, Hans Nachtsheim, Elisabeth Schiemann and co-workers) [9–11]. The situation was different in the Soviet sector of Berlin. Several scientists who had initially been working in research institutes at Berlin-Buch or at the Humboldt University in East Berlin moved to West Berlin after the foundation of the 'Free University' in West Berlin (American sector); for example, Hans Nachtsheim and Herbert Lüers.

There were many opponents of Lysenkoism who remained at institutes in the former GDR, but three distinguished scientists – Hans Stubbe, Gustav Becker and Kurt Mothes, working in institutes at Gatersleben resp. Quedlinburg and the Martin Luther University in Halle – had a particularly important role.

The role of Professor Hans Stubbe

The leading figure of the resistance against Lysenkoism in the GDR was Hans Stubbe (Fig. 1). In 1936, he was dismissed from the Müncheberg Institute by the Nazi authorities for political reasons ('leftist convictions'). Because of these anti-Nazi credentials, Stubbe was trusted by the East German authorities (although he never became a member of the communist party).

He became Director of the Crop Plant Research Institute in Gatersleben and Professor of Genetics in Halle, and was elected to the German Academy of Sciences at Berlin. In addition, in 1951, he was appointed as President of the newly founded German Academy of Agricultural Sciences in East Berlin. Thus, at an



Fig. 1. Hans Stubbe (1902–1989). Stubbe was PhD student and co-worker of the famous geneticist Erwin Baur (1875–1933), the founder of the Kaiser Wilhelm Institute for Breeding Research in Müncheberg (a small town 30 miles east of Berlin). In 1936, he was dismissed by the Nazi authorities for political reasons (leftist convictions). After World War II, he was director of the Crop Plant Research Institute in Gatersleben. In 1946, Stubbe became Professor of Genetics at the Martin Luther University in Halle, and was elected as a member of the German Academy of Sciences at Berlin. In addition, he became President of the German Academy of Agricultural Sciences at Berlin (1951–1968) [12–15].

official level he was the counterpart of Lysenko, who was president of the parallel Soviet institution in Moscow [12–15].

Stubbe criticized Lysenko from the outset. He expressed his doubts on the scientific validity of Lysenkoism in meetings with political authorities [16], and when the attacks of German Lysenkoists on him and his institute became too vigorous, he protested to the political authorities, including the General Secretary of the East German Communist party (SED) and the Prime Minister [12].

He and his co-workers tested Lysenko's hypotheses (especially the grafting experiments and the 'Mentor method') in his institute at Gatersleben. In a letter to me on 1 August 1984 Stubbe said, 'It was clear to us that Lysenko was a forger and a criminal. But it was not sufficient that we knew this. We had to demonstrate that his "results" were wrong. The Russians could not produce this evidence. We had to do it, and furthermore while Stalin was still in power.' [14]. All of these experiments gave clearcut negative results. None of the Lysenkoistic assertions could be sustained, as reported in several publications [17–24].

These publications were of great importance. First, they showed that

Lysenko's theories had been tested with absolutely negative results, and this was recognized by the political authorities. Second, these papers encouraged the growing opposition against of Lysenko in the Soviet Union and in other Eastern Bloc countries. They clearly demonstrated that, in an institute in East Germany, led by a famous geneticist and President of the Academy of Agricultural Sciences, Lysenko's assertions had been tested and disproved.

At Gatersleben, there were both pro- and anti-Lysenkoists. Stubbe was fair to PhD students who held Lysenkoistic views. However, he asked them to repeat Lysenko's grafting experiments, using proper genetic techniques (pure genetic material, including appropriate controls of scions and stocks, etc.). In this way, he was able to show these PhD students that Lysenkoism had no experimental basis [19–22].

When I came to his office in 1955 to discuss a topic for my PhD thesis, I told him directly: 'I am fully convinced that the Lysenkoistic ideas are wrong; therefore, I do not wish to perform any additional work to test these Lysenkoistic assertions'. Stubbe answered, 'Fine. Among my tomato mutants, which were induced after X-ray treatment, there are two mutant lines with a very unusual green-yellow variegation. Find out the genetic basis of these variegations!' That is what I did. One of these tomato mutants showed paramutation (1958); the other mutant line contained a chromosome fragment (1967) whose loss caused yellow-green variegation [24].

At Halle, Stubbe lectured uninterruptedly through the years when Lysenkoists were trying to obtain influence in East German universities. So, he was able to pass on genetic knowledge to students of agriculture and biology, and to recruit young scientists for his Gatersleben institute. Many of them went on to do modern genetic research and teach genetics in universities before and after Stubbe's retirement [14]. Stubbe was also very active producing books in German, making modern genetic literature available for East German students and scientists, especially the series *Genetics. Basis, Results and Problems in single Monographs*, which totalled 13 volumes [25,26]. Remarkably, all this happened in East Germany during a time when, in other Eastern Bloc countries, genetic research institutions were ruined and genetic teaching was forced to propagate Lysenkoistic views.



Fig. 2. Gustav Becker (1905–1970). Becker trained under Fritz von Wettstein, studying polyploids, and then entered the field of plant breeding, becoming Director of Breeding Research in the breeding firm Gebrüder Dippe in Quedlinburg. After World War II, in 1947, he became Professor and Director of the Institute of Plant Breeding in Quedlinburg, and, in 1951, in addition Professor of Plant Breeding in the Faculty of Agriculture of the Martin Luther University in Halle [27,28].

The role of Professor Gustav Becker

After World War II, Becker (Fig. 2) became director of the Quedlinburg Institute of Plant Breeding and Professor of Plant Breeding at the University of Halle. He was a close friend of Stubbe and influenced the choice of Gatersleben as the place for Stubbe's institute (1945–1946). Together with Stubbe and Rudolf Schick (another scientist with anti-Nazi credentials), he proposed the creation of a German Academy of Agricultural Sciences with the aim of coordinating activities in breeding and breeding research in East Germany. This proposal was accepted, and Becker became its Vice President (and Stubbe its President). Becker and Stubbe took part in many discussions about Lysenkoism, and prevented any harm to East German breeding institutes [27,28].

The role of Professor Kurt Mothes

Mothes (Fig. 3) was a plant physiologist and plant biochemist. From 1949 to 1957, he was Head of the Department of Biochemistry of the Gatersleben Institute, and he took an active part in the discussions about Lysenko. In 1957, he became professor at Halle. He was a gifted lecturer and frequently gave talks in other East German universities, where he openly criticized Lysenkoism. Mothes enjoyed debating with the audience and usually got the better of Lysenkoists because of his breadth of knowledge and talent for repartee.

In 1954, Mothes was elected President of the German Academy of Natural Scientists Leopoldina in Halle, and initiated the creation of a Darwin Medal of the Academy Leopoldina (1959). This medal was awarded to distinguished research workers in the field of genetics and evolution, among them were internationally well-known scientists from many countries, including opponents of Lysenkoism from the Soviet Union (N.V. Timofeev-Ressovskij, I.I. Schmalhausen, S.S. Chetverikov and N.P. Dubinin), but not a single follower of Lysenko.

This gesture was well understood both in the West and East, signalling in favour of 'normal' genetics and against Lysenkoism. Official representatives of science and policy in the Eastern Bloc were piqued. Mothes tried to present these medals to the Russian scientists in Moscow. After long negotiations, he was allowed to give the medal just to one of them (Schmalhausen); the others were claimed to be ill or too busy [29,30].

Of course, other scientists were also opponents of Lysenkoism, but they did not have the same opportunity, influence and steadfastness for an open confrontation with Lysenkoists as Stubbe, Becker and Mothes. For instance, Professor Hermann Kuckuck, an anti-Nazi who became director of the Central Research Institute for Plant Breeding Müncheberg in 1948 and who supervised the translation and editing of Lysenko's book *Agrobiologie*. He criticized Lysenkoism in public lectures and, as a result of confrontations with authorities, his situation in Müncheberg became untenable in 1950. He went to West Berlin, finally becoming professor of Applied Genetics at the University of Hannover [9,31].

The decline of Lysenkoism

The GDR government and the communist party, led by Walter Ulbricht, were somewhat hesitant about promoting Lysenkoism. They were aware that scientists like Stubbe, Becker and Mothes had a great scientific reputation both in the country and internationally. Also, they watched the development of Lysenkoism in the USSR (after Stalin's death in 1953) and the reactions of the international scientific community. Furthermore, the government was well aware of the open border to West Berlin and could foresee the consequences of a political pressure in favour of Lysenkoism. They did not wish to lose any more

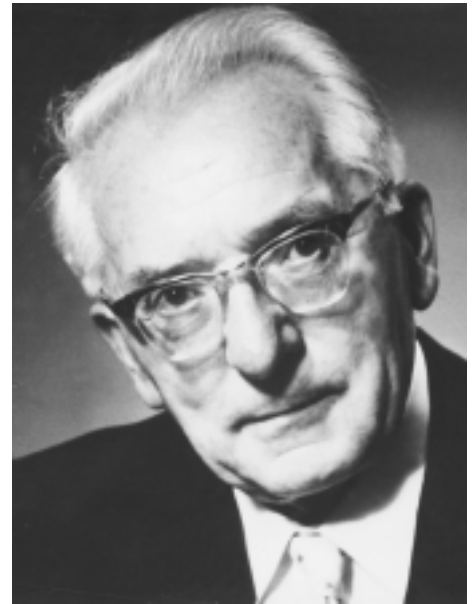


Fig. 3. Kurt Mothes (1900–1983). Mothes was a plant physiologist and plant biochemist. From 1949 to 1957, he was Head of the Department of Biochemistry at the Gatersleben Institute, and actively took part in the discussions about Lysenko. In 1957, he became Professor at the Martin Luther University, and later he Director of the Institute of Biochemistry of Plants, Halle, of the German Academy of Sciences at Berlin. From 1954 to 1974, he was President of the Deutsche Akademie der Naturforscher Leopoldina in Halle [29].

distinguished scientists; there had already been too many who left East Germany for West Berlin and West Germany.

In contrast to other European socialist countries, the distinct opposition against Lysenkoistic ideas in the institutes of the *Deutsche Akademie der Wissenschaften* (Academy of Sciences) and the *Deutsche Akademie der Landwirtschaftswissenschaften* (Academy of Agricultural Sciences), and the growing opposition within the universities led to a relatively early decline of Lysenkoism in East Germany and prevented damage of research work.

However, an open and free critical debate on Lysenkoism, its proponents and supporting scientists as well as its political supporters (in the background) never took place in public in the GDR (neither on radio and television, nor in newspapers or general journals). This was in line with the official policy of the government and the ruling party and frequently was expressed with the slogan: 'We do not want any discussion of previous mistakes!' (in German: *Keine Fehler-Diskussion!*).

Lysenkoism came to its final end with the political downfall of Chruschev in the Soviet Union (Box 2). With the assumption of power by Brezhnev in 1964, the Lysenko

period was over. A main reason for Chruschev's downfall was severe failures in agricultural productivity – and this was connected with Lysenko's activities. Parallel to his theoretical ideas, Lysenko had given his promise (to Stalin and Chruschev) that the application of his 'new theory' would lead to an increase of agricultural yields. However, in the late fifties and sixties it became more and more plain that these practical proposals did not actually produce more crops.

In summary, Stubbe, Becker and Mothes, backed by many colleagues, were able to avoid any influence of Lysenkoism on their work in genetics and breeding in the research institutes of the Academy of Sciences and the Academy of Agricultural Sciences of the GDR until the breakdown of Lysenkoism in the USSR in 1964.

References

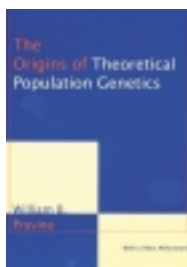
- Soyfer, V.N. (1994) *Lysenko and the Tragedy of Soviet Science*, Rutgers University Press
- Medvedjev, Z.A. (1969) *The Rise and Fall of T. D. Lysenko*, Columbia University Press
- Soyfer, V.N. (2001) The consequences of political dictatorship for Russian science. *Nat. Rev. Genet.* 2, 723–729
- Popovsky, M. (1984) *The Vavilov Affair*, Shoe String Press
- Lysenko, T.D., ed. (1949) *Über den Stand der Biologischen Wissenschaft. Stenographischer Bericht über die Tagung der W.I.Lenin-Akademie der Landwirtschaftswissenschaften der UdSSR (31 Juli–7 August 1948)*, Verlag für Fremdsprachige Literatur Moskau
- Zacharias, M. (1964, 1965) *Lehrbuch der Biologie, 12. Klasse., 10. Klasse, 12. Klasse*, Verlag Volk und Wissen
- Höxtermann, E. (2000) 'Klassenbiologen' und 'Formalgenetiker' – Zur Rezeption Lyssenkos unter den Biologen in der DDR. *Acta Historica Leopoldina* (Halle/S.) 36, 273–300
- Hossfeld, U. and Olsson, L. (2001) Between science and politics: Axolotl research at Jena University, Germany, during the Lysenko era (1950s–1960s). *Axolotl News* 29, 12–15
- Siemens, J. (1997) Lysenkoismus in Deutschland (1945–1965). *Biologie in unserer Zeit* 27, 255–262
- Brix, K. (1952) Untersuchungen über den Einfluß der Pfropfung auf Reis und Unterlage und die Möglichkeit einer Übertragung eventueller Veränderungen auf die Nachkommen. *Ztschr.f. Pflanzenzüchtung* 31, 285–288
- Schiemann, E. (1948) Review on Hudson, P.S., Richens, R.H.: The new genetics in the Soviet Union, 1946. *Naturwissenschaften* 35, 62–64
- Käding, E. (1999) *Engagement und Verantwortung. Hans Stubbe, Genetiker und Züchtungsforscher*, ZALF-Bericht Nr. 36
- Hagemann, R. (1985) Einige Hauptentwicklungslinien der Genetik seit 1985. In *Beiträge zur Wissenschaftsgeschichte* (Wendel, G., ed.), pp. 93–110 Wissenschaftsentwicklung von 1945 bis zur Gegenwart. Deutscher Verlag der Wissenschaften
- Hagemann, R. (1999) Hans Stubbe – Genetiker, Forscher, Wissenschaftsorganisator, Mensch. *Biospektrum* 5, 306–309
- Böhme, H. (1998) Hans Stubbe (1902–1989). Mutationsforschung und Pflanzenzüchtung. In *Sachsen-Anhalt – eine Wiege der Pflanzenzüchtung. Vorträge für Pflanzenzüchtung* (Stein, M., ed.) Heft 40, 61–68
- Stubbe, H. (1952) Über einige Fragen der Genetik. In *Die sowjetische Agrarwissenschaft und unsere Landwirtschaft. Protokoll der Tagung des ZK der SED mit führenden Agrarwissenschaftlern am 25./26.5.1951 in Berlin*, pp. 96–112, Dietz Verlag
- Stubbe, H. (1954) Über die vegetative Hybridisierung von Pflanzen. Versuche an Tomatenmutanten. *Kulturpflanze* 2, 185–236
- Stubbe, H. (1955) Über die Umwandlung von Winterweizen in Sommerweizen. *Züchter (now Theor. Appl. Genet.)* 25, 321–330
- Böhme, H. (1954) Untersuchungen zum Problem der genetischen Bedeutung von Pfropfungen zwischen genotypisch verschiedenen Pflanzen. *Ztschr. f. Pflanzenzüchtung* 33, 367–418
- Böhme, H. (1957) Weitere Untersuchungen zum Problem der genetischen Bedeutung von Pfropfungen zwischen genotypisch verschiedenen Pflanzen. *Ztschr. f. Pflanzenzüchtung* 38, 37–50
- Zacharias, M. (1956) Ein Versuch zur Beeinflussung der F₂-Spaltungen von Bastarden aus der Gattung Antirrhinum durch Pfropfung von F₁-Bastarden auf ihre Ausgangseltern. *Kulturpflanze* 4, 277–295
- Zacharias, M. (1957) Über die Anwendbarkeit der Methode der vegetativen Annäherung zur Erhöhung der Kreuzbarkeit einiger Wildkartoffelarten mit der Kulturkartoffel. *Kulturpflanze* 5, 240–252
- Böhme, H. (2000) Genetik in der Klammer von Politik und Ideologie - Persönliche Erinnerungen. *Acta Historica Leopoldina* (Halle/S.) 36, 111–136
- Stubbe, H. (1982) *Geschichte des Institutes für Kulturpflanzenforschung Gatersleben der Deutschen Akademie der Wissenschaften zu Berlin 1943–1968*, Akademie-Verlag
- Stubbe, H. (1963) Kurze Geschichte der Genetik bis zur Wiederentdeckung der Vererbungsregeln Gregor Mendels. (Beitrag 1 von Genetik. Grundlagen, Ergebnisse und Probleme in Einzeldarstellungen), p. 232, Gustav Fischer Verlag
- Brandsch, H. (1983) Genetische Grundlagen der Tierzüchtung (Beitrag 13), p. 406, Gustav Fischer Verlag
- Hoffmann, W. (1971) Nachruf auf Gustav Becker. *Zeitschr. f. Pflanzenzüchtung* 65, 89–94
- Unger, K. et al. (2001) Prof. Dr. Dr.h.c. Gustav Becker und die Züchtungsforschung in Quedlinburg. *Quedlinburger Annalen* 4, 78–86
- Parthier, B. (2001) Kurt Mothes (1900–1983). Gelehrter, Präsident, Persönlichkeit. *Acta Historica Leopoldina* (Halle/S.) 17, 150
- Gerstengarbe, S. (2000) Die Leopoldina in den konfliktreichen Jahren 1958–1962. *Acta Historica Leopoldina* (Halle/S.) 36, 63–100
- Kuckuck, H. (1988) *Wandel und Beständigkeit im Leben eines Pflanzenzüchters*, Verlag Paul Parey

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Book Review

How population and quantitative genetics began



The Origins of Theoretical Population Genetics

by William B. Provine
The University of Chicago Press, 2001.
\$17.00 pbk
(211 pages)
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The genetic analysis of quantitative traits, formerly somewhat of a backwater, is now big business, because of the new prospects for exploiting it for medical and agricultural purposes. Population geneticists, having long been treated as largely irrelevant to modern genetics, were described as being in short supply in a recent issue of *Nature* [1], in the light of the need to analyse large quantities of data on human molecular variation. This reissue of Will Provine's outstanding 1971 book on the early history of these fields is thus very timely, because much of the material might be unfamiliar to geneticists who were trained after the early 1960s.

Provine shows how Darwin's view of gradual evolution by natural selection faced many criticisms by his contemporaries, owing to the lack of understanding of inheritance. In response to this situation, Francis Galton developed the concept of regression, in which the deviation from the population mean of a group of individuals was related to that of their relatives by an empirical coefficient. This was the origin of the statistical methods for describing the resemblances between relatives, greatly elaborated by Karl Pearson. Galton believed that the phenomenon of regression meant that selection could not produce any