abolish the distinction, at that time strictly maintained in Europe, between pure science and its various applications. Thenceforward he laboured incessantly to ensure that mathematics should "keep in touch with practical life." —

Once when Hilbert had to take the place of Klein + take charge of the student of the mathematical school ~~to~~ going to one of the annual Engineers' conferences at Hanover:

"One hears a lot of talk about the hostility between scientists and engineers. I don't believe in any such thing. In fact I am quite certain it is untrue, there can't possibly be anything in it, because neither side has anything to do with the other"

100,000 gold marks bequeathed by a learned citizen of Darmstadt for a prize for solution of Fermat's last theorem. The interest on the fund utilized for holding a series of lectures in Göttingen: Poincare, Lorentz Sommerfeld, Planck, Debye, Nernst, Bohr

and Smoluchowski were among those that were thus invited. "Bond - I shall take good care not to kill the goose that lays us such splendid golden eggs."

Klein, Runge, Minkowski and Hilbert — the famous quartet — climbing up to Kehr Hotel on the heights —

This will never do! Physics is obviously much too difficult for physicists — Hilbert.

The wealthy father of Max Born — the father was a well-known Breslau biologist — had given him the following advice before he began his studies — "Be sure you try out all the courses before you decide which one to follow" He entered his name simultaneously for lectures on law, literature, psychology, political economy and astronomy & he preferred the last since he liked best the lecture hall in which the astronomy lectures were given.

"Perhaps you can see the next step" — Franck to his class when he had lost his way on the blackboard.

Study Group on Matter conducted in Room 204 of the Mathematical Institute by Born Franck and Hilbert.

Knights of ~~the~~ Columbus in reverse —

A surprising number of the wives of professors in the five continents came from the little town of Göttingen.

Astrophysicist Robertson: wanted in a hurry to check the col- of a letter he was going to post-. So he burst- into a shop and breathlessly asked the girl behind the counter Haben ~~Sie~~ eine Wiege? Ich möchte etwas wagen. (Have you a cradle? I want to do something risky) When the girl went- red ... he corrected himself "I beg your pardon. I meant- to say Haben Sie eine Waage? Ich möchte etwas wiegen." Have you a pair of scales? I want- to weigh something"

Economic circumstances render it impossible for Oppenheimer to remain in Göttingen after the end of the summer term —

(Heisenberg)

He had brought his revolutionary quantum ~~theory~~ mechanics with him in 1925 from Heligoland, where he used to go climbing on the red cliffs, while he read Göethe's West-Österlicher Divan . .

/

The following quartrain is attributed to Dirac

Age is of course a fever chill
that every physicist must fear
He's better dead than living still
when once he's past his 30th year.

Dirac son of a Swiss father and an English mother —

Wolfgang Pauli from Vienna who once danced for joy in the middle of the Amalienstrasse at Munich —

Fritz Houtermans (Austrian) & Atkinson (English) in 1927 .... (anticipting fusion?) explaing source of solar energy —

Houtermans reports "That evening after we had finished our essay I went for a walk with a pretty girl. As soon as it grew dark the stars came out, one after another, in all their splendour. "Don't they sparkle beautifully!" cried my companion. But I simply stuck out my chest and said proudly "I have known since yesterday why it is they sparkle." She didn't seem in the least moved by this statement. Perhaps, she didn't believe it. At that moment probably she felt no interest whatever in the matter."

Abraham Joffe in Franck's house in Göttingen in 1929 — declared that in his own institute at Leningrad

(Contrasting conditions where scientists were forbidden to ~~start~~ work before 10 or after 4) ~~unlike~~ in Gottingen, there were 300 students & numerous well paid assistants. They could all reckon up on safe employment and steady promotion at a later date, for their aspiring country needed competent scientists.#

"Yes all that sounds pretty good, but I often feel as if I were living on the top of a volcano. One never knows when or for what reason it is actually going to boil over.

Minister of Edn. Rust, at a banquet was unwary enough to ask Hilbert ~~who~~ "Is it really true, Professor, that your Institute suffered so much from the departure of the Jews and their friends? Hilbert snapped back as coolly as ever "Suffered, eh? No, It hasn't suffered. It just doesn't exist anymore.

When Einstein moved to Princeton, Langevin is reported to have said "It's as important an event as would be the transfer of the Vatican from Rome to the New World. The 'Pope of Physics' has moved, and the United States will now become the centre of the Natural sciences".

In the autumn of 1933 at the Br. Ass Lord Rutherford made a speech in wh he observed that people who were prophesying the release of atomic energy were "talking moonshine"

Langevin in trying to console a student of history who had escaped from Hitler's Germany. "You are taking it all much too serious[ly] - Hitler? It will be long before he breaks his neck like all tyrants. I am much more worried about something else. It is something which if it gets into the wrong hands, can do the world a good deal more damage that that here today and gone to morrow jackass. It is something which — unlike him — we shall never be able to get rid of. I mean the neutron.

It used to be said of Rutherford "He's a savage, a noble savage perhaps, but still a savage". Or again: relations with R are not ordinary. One couldn't be friendly with a force of nature"

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when R wrote to the Russian Govt requesting that Kapitza shd be allowed in the interest of science, to return to his duties, the Russ. Govt replied: "Of course England would like to have Kapitza. We

for our part- we equally like to have Rutherford in the Soviet- Union.

As late as the beginning of 1939 Bohr specified to his colleague Wigner at Princeton 15 reasons why in his opinion practical exploitation of the fission process was improbable. Einstein assured the American reporter W.L. Lawrence that- he did not believe in the release of atomic power. And Otto Hahn according to the young German physicist Korsching, exclaimed during a discussion held with a few of his closest- colleagues regarding the practical exploitation of his discovery "That- would surely be contrary to God's will!"

Leo Szilard when asked what his hobby was is reported to have replied "Beating brasshats!"

In 1933 realized if in process of fision each neutron produced more than one neutron, a chain reaction might be set up.

Einstein when approached by Szl + Wigner was willing to help, and if necesary "stick his neck out"

Ever since 1933 Sachs had been one of the unofficial, but extremely influential advisers

of the American President (Roosevelt). They all had to possess, in conformity with the latter's own definition, "great ability, physical vitality and a real passion for anonymity"

When 6 years later the 1st atom-bomb was employed against Japan, a country already on the verge of capitulation, Einstein felt that he himself and the atomic scientists who had worked on the construction of the weapon had been deceived

E said with deep regret after the war "If I had known that the Germans would not succeed in constructing the atom-bomb I would never have moved a finger." [Till 1942 the Germans did not think they needed any new weapons. the development of V_2 long range rocket came at a stage when the position was desperate]

Laue to Houstermans regarding the practical application of the chain-reaction "My dear colleague, no one ever invents anything he does not really want to invent!"

Sachs to Roosevelt "All I want to do is to tell you a story. During the Napoleonic wars a young American inventor came to the Fr. Emperor and offered to build a fleet of steamships with the help of which Nap. cd, in spite of the uncertain weather, land in England. Ships without sails? This seemed to

the Corsican so impossible that he sent Fulton away. In the opinion of the English ~~His~~ historian Lord Acton, this is an example of how England was saved by the short-sightedness of an adversary. Had Napoleon shown more imagination and humility" concluded Dr Sachs "in history of the 19th cent'y w'd have taken a very different course."

In USA supreme control of atomic research was transferred from the scientists to a Military Policy Committee consisting of 3 members of the Armed Forces, Genl Styer, Adm'l Purnell & Genl Groves and only 2 professional investigators Dr Vannevar Bush & Dr James Conant [The plan came to be known as DSM (devel't of substitute materials] of Manhatten Project.

"Greasy" Groves "Gee Gee", addressing ~~Assembling~~ his staff at Los Alomas for the 1st time "your job won't be easy. At great expense we have gathered here the largest collection of crackpots we have ever seen"

He (L.G.) repeatedly tried to prove to them that his ability was at least equal to theirs even in their own sphere. "The 1st time we had any serious discussion" he relates "I caught the gentlemen out in a mistake

in arithmetic."

For he (Bohr) generally crossed the New York streets at prohibited places, thus obliging no less than 6 guardians of the law to join him in contravening traffic regulations.

"Are you not Frau von Halban?" Bohr enquired courteously when he met her in the lift of a skyscraper." In an instant came the sharp retort- "No, you are mistaken. My name is Placzek now" But surely you are Professor Bohr!" He replied with a smile "No, you are mistaken. My name is Baker now" [Nicholas Baker]

"within 5 mins of Bohr's arrival". G.G. reported later in describing this prize specimen of his collection of 'crackpots' he was saying everything he promised he would not say"

Feynman succeeded in deciphering the combination numbers of a steel safe containing top secret & left inside a slip "Guess who?"

Los Alomas 35 miles from Santa Fé
Oppenheimer when asked what decided his joining Berkley "Just a few old books. I was enchanted

by the collection of 16th & 17th cent- French poetry in the Univ. Library.

Oppie's friends ~~were~~ believed that- he was worried at- not- having climbed, like Heisg., Dirac, Joliot- + Fermi, who were about- the same age as himself, the highest- peaks of creative work in physics"

My 2 great- loves are physics + New Mexico. It- is a pity they can't be combined" — Oppie.

Teller, when he arrived at- Santa Fé asked Allison who had come to meet- him, ~~the~~ whose statue was the one in front- of the cathedral "It's Archbishop Lamy" But- if any one asks you who it- is you'd better say Mr Lamy. Otherwise you'll have Dorothy (McKibben) on your trail right- away"

No Dr or Professor

Oppie was almost- engaged to Jean Tatlock but- ultimately married ~~to~~ Katherina Penning

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p. 171 Shortly after Goudsmit- had discovered Weizsäcker's papers dealing with the German atomic project- he went- for a walk with a major who had been attached to the Alsos group, in the capacity of liaison officer with the War Dept-. "I told it-

wonderfully" he remarked "that the Germans have no atom bomb? Now we will have to use ours."

The professional soldier's retort shocked Goudsmit. The former out of his many years' experience of the military mind, prophesied:

Of course, you understand, Sam, that if we have such a weapon we are going to use it"

p 172 "Humanity needs the new source of power which we have discovered and developed. All that we have to do is to take care that in future it shall be used for peaceful purposes instead of for destruction"

Bohr's memorandum to Roosevelt & Churchill on need for international understanding against misuse of atomic power, is dated 3rd July 1944

Pope raised his voice against atomic weapons in a speech on Feb 21, 1943.

Churchill after Bohr had explained to him his memorandum in a personal interview, is reported to have turned to Cherwell & asked with a shake of the head "What is he really talking about? Politics or Physics?"

174 Sachs's draft of a directive to govern the use of the atomic bomb, which according to him had been accepted by Roosevelt, does not seem to have been ever communicated to Stimson, his Secy of War at the time.

p. 177 · On the short- list- of targets for the atom bomb, there figured, in addition to Hiroshima, Kokura, and Nigata, the Japanese city of temples Kyoto. Prof Reischauer visited Mayor Mac Cormack (a New York lawyer) to persuade Stimson to reprieve Kyoto + have it crossed off the black list-. [Those 4 cities were to be spared bombadment- & other bombs!].

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178 During 1943 + part- of '44 our greatest worry was the possibility that- Germany would perfect- an atomic bomb before the invasion of Europe .... In '45 when we ceased worrying about- what- the Germans might- do to us, we began to worry about- what- USA might- do to others. — Szilard

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179 Harrison Brown comments on Sz's visit- to Byrnes: "If he had been taken as seriously by B as he had been taken seriously by the Roosevelt- more than 5 yrs previously the whole course of history might- have been altered.

Stimson advised Truman to set- up a Committee of experts to advise the Pres. on these matters. 5 of the members were prominent- politicians: In addition there were the 3 scientists who were already in charge of research for military purposes Van. Bush, K.T. Compton + Conant-. This was reinforced by a scientific panel, Oppenh.,

Fermi, Arthur Compton & Lawrence. these scientists, except- Fermi, were known among their colleagues for their tendency "to play ball with the politicians and soldiers"

On the conclusion of the meetings the following recommendations were forwarded to Truman

1. the bomb shd be used against- Japan as soon as possible
2. ~~the~~ It- shd be used on a dual target— i.e. a military install:n or war plant- surround by or adjacent- to houses and other buildings most- susceptible to ~~damage~~ damage.
3. It- shd be used without- prior warning of the nature of the weapon.

3 was considered by Ralph A Bard, who represented the Navy at these discussions, to be so unfair that- he afterwards withdrew his agreement- to the plan in q:n. His was the only voice that- registered even a mild protest-.

[When similarly the supreme legal authority at the Am. Navy Dept- was consulted about- biological attack on Japan, his opinion was that- so inhuman a weapon would be an offence against- the laws of war and completely unworthy of the Navy.

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190 Mrs Jette reports 'one day as I was passing an old acquaintance, I quite innocently said "Good

morning!" He instantly turned upon me in a fury "what is so good about the morning?"

Slotin who tested the critically by putting the 2 hemispheres together. — He called it twisting the dragon's tail.

The question whether the first complete atom bomb wd be a dud or a success, or as they said at Los Alamos, a girl or a boy aroused intense interest. Most estimates were too low by far. ~~Except~~ The only estimate that was nearly correct came from Oppie's friend Robert Serber. "It was really only out of politeness. I thought that as a guest I ought to name a flatteringly high figure."

After the Alamogordo test July 16, 1945.

Good God! I believe that the longhaired boys have lost control.

198 Oppie was clinging to one of the uprights in the control room. A passage from the Bhagavadgita the sacred epic of the Hindus flashed into his mind:

If the radiance of a thousand suns
were to burst into the sky,
that would be like/the splendour
of the Mighty One —

दिवि सूर्यसहस्रस्य भवेद्युगपदुत्थिता ।
यदि भाः सदृशी सा स्याद्भासस्तस्य महात्मनः ॥

Yet- when the sinister and the gigantic cloud rose up in the far distance over the Point Zero, he was reminded of another line from the same source

I am become Death, the shatterer of the worlds.
——— காலோஸ்மி லோக க்ஷயகிருத் ப்ரவ்ருத்தோ லோகான்
ஸமாஹர்துமிஹ ப்ரவ்ருத்தஃ।

The war is over, One or two of those things and Japan will be finished — G.G.

Even Fermi who had always said "Don't bother me with your conciention scruples! After all the thing is superb physics!", He was visibly shocked. He confessed that he did not feel capable of driving his car.

And we urged that the Govt- start- immediately to study the possibility of securing International control of the new weapon.— Harrison Brown.

It would have been difficult to forbid the men on research to sign the document- (Szilard's petition) He had it declared 'secret'. It was the law that secret papers could only be taken from one place to another under military guard. Thus all that Groves did had to do was to decree " Unfortunately we can't spare any troops for the protection of this document. Until we can do so it must be kept- locked up.

Tojo "Japan is defeated. We must face that fact and act accordingly"

Grove's remark "Truman did not so much say 'yes' as not say 'no'. It would have taken a lot of nerve to say no at that time" —

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p. 21b Gerlach in his diary Report. at Godmanchester (not far from Cambridge) prison — his colleagues were Hahn, Heisenberg, Weizsäcker, Laue, Hahteck Bagge and three others —

The younger men, especially, began to reproach their seniors. Had the latter been rigor-, it was asked, in not constructing the bomb? If Germany had possessed such a weapon, would it not have been possible to extort more favorable peace conditions? The older men answered that it was fortunate for German atomic physics to have been spared the heavy burden of guilt which allied nuclear physicists will probably now have to face.

Hahn, when he heard the news of Hiroshima, "What a hundred thousand lives lost? That is terrible, the supervising officer of the prison who conveyed the news replied "No need to get so excited. It is better for a few thousand Japs to perish than a single one of our boys."

~~Godach in his diary~~ the argument that the lives of many soldiers of the United Nations were saved by the atomic bombardment of Japan, was met at a later date by the well-known American clergyman Monsignor Sheen "That was precisely the argument Hitler used in bombarding Holland."

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217 Were they (on the mesa) ~~it~~ now to be proud of what they had done, or should they be ashamed of their work? Or again ~~Are~~ was it possible — and this position would be the strangest of all, really only comparable with the contradictory data of atomic physics — for one and the same person to feel pride and shame simultaneously?

They were nicknamed 'titans' and compared with Prometheus, who had challenged Zeus, the controller of the Fates; they were also called "gods from hell"

'Willie' Higginbotham (electronics) — I think I now know the meaning of mixed emotions. I am afraid that Gandhi is the only real disciple of Christ now.

The one that was dropped on Hiroshima was called the 'thin man', as compared to the one in Store at the island of Tinian which was called the "fat ~~or~~ man". It was later to be dropped on Nagasaki.

231 Before the war we (atomic scientists) were supposed to be completely ignorant of the world and inexperienced in its ways. But now we were regarded as the ultimate authorities on all possible subjects, from nylon stockings to the best form of international organiz^n."

— Their ~~pres~~ prestige was mainly due to their having been "brilliant cooperators with death" — But whenever they started to confess their sins their public interest in them became still further enhanced —

235 Oppie's friends believed that Washington's influence on him was greater than his on W.

— The profound shock that was then administered to people's feelings of security is illustrated by the retort, published in Time of an 8-year old boy to the qn. "What do you want to be when you grow up?" He answered "Alive!"

243 Kowarski recollects that when he asked a group of American lecturers and students after the war what they were discussing so eagerly, he received the slightly ironical answer: "Oh we are just wondering what we are going to say in Einstein's latest letter to the President"

— It should not be forgotten that the atomic bombs were made in this country as a preventive measure. It was to head off its use by the Germans if they discovered it. We are in effect

making the low standards of the enemy in the last war our own for the present. – Einstein

Yes we have now to divide up our time like that, between politics and our equations. But to me our equations are far more important. For politics are only a matter of present concern. But a mathematical eqn stands for ever." – Einstein.

'47 G.G. humorously remarked: "What happened is what I expected, that after they have had this extreme freedom for about 6 months they all started to get itchy feet and as you know almost every one of them has come back to Govt research, because it was just too exciting".

'46 To speak about atomic energy in terms of the atomic bomb is comparable with speaking about electricity in terms of the electric chair"

Teller as the "Apostle of the Super"

'27 That paradise of pure research (Bethe's ~~last~~ Inst. at Ithaca) was invaded towards the middle of Oct-'49 by Ed. Teller, the advocate of the hell-bomb for ~~the~~ the purpose of leading B into temptation.

Teller ... needs ... some control, some other person who is more able to find out what is the scientific fact about the matter. Some other person who weeds out the bad from the good ideas." Such was Bethe's judgment of his visitor. And he could see himself perfectly well in the part of "the other person".

James Conant referred to in research circles as 'Uncle Jim' —

280 The exploitation of the deepest secrets of creation for the purposes of destruction is a shocking act — Joseph & Stewart Alsop. Am. journalists.

"The armament race between the USA & USSR originally supposed to be a preventive measure assumes an hysterical character. On both sides the means to mass destruction are perfected with feverish haste behind the respective walls of secrecy.

"If successful, radioactive poisoning of the atmosphere and hence annihilation of any life on earth has been brought within the range of technical possibilities. The ~~globe~~ ghost-like character of this development lies in its apparently compulsory trend. Every step appears ~~to be~~ as the unavoidable consequence of the preceding one. In the end there beacons more and more ~~of~~ clearly general annihilation."

Einstein

281 It is argued that it would be better for us to lose our lives than our liberty; and this I personally agree with. But I believe this is not the question. I belive that we will lose far more than our lives in a war fought with hydrogen bombs, that we would in fact lose all our liberties and human values at the same

time, and so thoroughly that we will not recover them for an unforeseeably long time." — Bethe. in Sc. American. [This issue was confiscated by Govt.]

"If we fight a war and win it with hydrogen bombs what history will remember is not the ideals we were fighting for but the method we used to accomplish them. These methods will be compared to the warfare of Genghis Khan, who ruthlessly killed every last inhabitant of Persia —

p. 282. The experience of the scientists who have worked on the atomic bomb has ~~since~~ indicated that in any investigation of this kind the scientist ends by putting unlimited powers in the hands of the people whom he is least inclined to trust with their use. — Norbert Wiener

I am afraid my inner troubles stayed with me and are still with me and I have not resolved this problem. I still fear that maybe I have done the wrong thing. But I have done it." Bethe

289 However, it is my judgment in these things that when you see something that is technically sweet you go ahead and do it and you argue about what to do about it only after you have had your technical success. That is the way it was with the atom bomb. Opp.

This remarkable admission perhaps explains why the 20th century Faust allows himself in his obsession with success, and despite occasional

twinges of conscience to be persuaded into signing the pact with the Devil that confronts him: he finds that what is "technically sweet" nothing less than irresistable.

Eniac

Maniac Mathem[l] analyser, numerical integrator and computer

Dr Miracle von Neumann

Mike.

Dry bomb. (Fis[n]. Fus[n]. Fis[n].) FFF bomb

"appeasers" and "alarmists"

is both a spectator and an actor in the great drama of being — Bohr

The space in which man has developed as an intellectual being has more dimensions than that of the single direction in which he has moved during the last few centuries — Heisenberg.

Wolfgang Pauli formerly known to the family of atomic scientists as a sceptic has indicated a possible road for humanity to take At Copenhagen in 1932 P had played Mephisto to Faust But by 1955 his keen mind had so extended its field of vision that he became the eloquent exponent of a long-neglected inner way to salvation. At-

The close of a lecture ~~on of~~ 'Science and Western thought' he stated "Since the 17th cent. the activity of the human spirit have been classified in separate compartments. But in my view the attempt to eliminate such distinctions by a combination of rational understanding and the mystical experience of unity, obeys the explicit or implicit imperative of our own contemporary age."

Moden Science has hitherto been inspired ~~to~~ by 'the proud will to master Nature' It is an attitude which found expression above all in Bacon's aphorism "Knowledge is power" But today one far more often hears it in the form "Knowledge is unfortunately power" The scientist has come to fear his god-like character, as Feynman puts it and confesses his intellectual humility in the face of unanswerable secrets which ought to remain unanswered."

Dr Robert Jungk : Brighter than a thousand suns : The moral and political history of the atomic scientists. (Gollancz . Hart-Davis 1958) Transl. from German Stuttgart publication.

Rutherford in explanation of his not attending a meeting of the Committee of experts to advise on new systems of defence against hostile submarines (near the end of the 1st world war):

"I have been engaged in experiments which suggest that the atom can be artificially disintegrated If it is true it is of far greater importance than a war"

note by K. In the book this meeting referred to is stated to be a British Committee. whereas I have heard that this appears in a message to Langevin explaining his absence, and the meeting was to be in France.

Deny the powerful and their warriors entry into your workshops. For such people misuse the holy secrets of Nature to serve their own worldly ambitions.

Chadwick who was interned in Germany during the first world war was provided by Nernst, Rubens, Warburg and others all facilities for his work. (on formation of carbonyl chloride in light)

Sommerfeld referring to the fluid nature of theoretical atomic physics in the twenties:

"Caution! Dangerous structure! Temporarily closed for complete reconstruction!"

Rutherford referring to the theoretical physicists of the period: "they are getting too big for their boots. We practical physicists will have to take them down ~~a~~ a peg or two."

In 1939 while on a visit to Bristol, Tyndal told me this story: He was then the secretary of the British Ass. Rutherford was the president, and the meeting was to be in South Africa. R was invited to give one of the evening lectures. T suggested that he might speak on "Modern trends in physics" "I cannot make that the subject of a whole lecture. I can say all that in just two sentences. The theoretical physicists have all got their tails up. It is up to us experimental physicists to pull them down by their tails" ——

Note by K

K

Rutherford presiding over a lecture by A.V. Hill: You make noise like a physicist

Rutherford had expressly stated his opinion that the world would never be able to exploit the slumbering might of atomic power. It was an error in which he continued to believe until his death in 1937.

Robert Jungk: Tomorrow is already here: [transl. from Gegenwart Eon. 1952)] : Hart-Davis 1954.

Herbert Agar & We should not be surprised that the author after such a life-experience, is sensitive to any symptom of inhumanity and "sniffs the approach of tyranny on every tainted breeze"

The author is attacking a deformity of the whole western world — the materialism which if continued must dehumanize us. Our effort to explain life in terms of the inanimate, our rage to ~~the~~ bend every time-honored institution into the service of the new metallic demons, our eagerness to turn even the humanities into an imitation of natural science (an eagerness which began in Germany, ~~as~~ not in America) — this is the great modern heresy. And like most heresies, it is in fact a wild exaggeration of an otherwise sensible point of view.

As ~~since~~ the U.S. is very large and very zestful, her vices and her virtues appear in jumbo size, easy to isolate, easy to describe.

14 But in fact "the log-cabin President", the rugged individualist, the selfmade man who worked his way from rags to riches have scarcely ~~(easy)~~ more connection with the actual present of the U.S. than Cathedrals, castles, can-can and folk music have with the post-war realities of Europe.

they have become museum pieces, attractions for tourists and grateful topics for speakers at a loss for ideas on patriotic occasions.

20 "For behind each door we open lies ~~so~~ a passage with many other doors which again we must unlock, only to find behind each others to still others." quoted by Jungk.

26 It's a war to the death between the Servies, friend. It wouldn't surprise me if a little bomb went off one day. After all what's the stuff there for?

28 And They (the Indians) ask me ironically but with serious faces why the white man needs to protect his "holy places" with so many watchmen, high-tension wires and alarm systems. "With us the law of the ancients is enough." they say "... Fences are put up for cattle who don't understand words, or to keep out wild animals. Men know how to respect secrets.

But how does he know all that? Because he records the conversations ... with a hidden microphone" He too is only a white man and can't respect secrets.

~~Above~~ Alamogordo "the cradle of the Atomic Age and of Rocket Development.

28 We didn't ask them to come. We don't even make a profit out of them, as they buy nearly everything in the PX military stores.

29 What neither centuries of Christian missionary work nor the efforts of the American administration — first violent, later enlightened — succeeded in doing, technology and the dollar have accomplished in a couple of years.

30 It has been won over to the "money and results" principle of the white world around it

This bit of nothing in the middle of nothing at all.

"Trinitite" or the Trinity stone (slime colored lamina formed by the Atomic Explosion

Drop that thing. It is still live.

32 The white sands proving ground.

the two ridges on either side called the hedges

Down there where the bandits and candle thieves used to hide.

33 the sky is impeccably blue.

Mighty mouse Holy Moses - names of rockets

35. Fashion and gallantry cannot manage without a few crumbs of French, sport without English, the opera without a loan from the Italian. But the technical language of the rocket specialist & future space navigator, born in the chaos of war, is shot through with German. Words such as Meilerwagen

a special implement invented during the 2nd world war in Peenemünde for the transport of V- weapons or the Mischgeriät an important- piece of rocket motor, belong to the language (German) of these workmen.

36 Signs not unlike Arabian Scrol lettering.

43 Liquid oxygen referred to as LOX, which is the name of a salmon- spread offered by Newyork delicatesen stores.

49 If in the course of one attack a 3rd of our bombers were lost-, but- at the same time the no of ~~double~~ direct hits was doubled, it was cheaper than 2 attacks with 1/5 losses in each.

51 Hot rods (racing cars)

59 The disaster has really hit him hard. Think of the paperwork which the poor man has ahead of him. To begin with all the condolence letters he'll have to write ---

64 Measured by the flying tasks which lie ahead of him, man is a faulty construction. Will he remain a drag on progress?

Something's simply got to be done to get over these annoying deficiencies. They wont stop us.

"It can be done" "No problem is insoluble" "Nothing is unattainable". are the fundamental dogma of the new generation.

101 It is as though the country without castles, moats and drawbridges were making up for its lack of middle ages.

"I'd like to know who those guys think they are, as ~~if~~ we didn't pay taxes for them."

European scientists working up here have remarked that this was how they had pictured the castle of the Grail seen from a distance.

103 For a time in the atomic ~~city~~ town society, which leaned towards an occupational caste system, the many-numbered † were looked upon as an elite. († eligible for entry into more than one section)

105 A modern version of hopscotch in which chalked squares to be jumped had "radioactive", or "contaminated" written on them.

106 Even so we are regular guys up here. If only the people outside would realize that we are quite as human as themselves. To judge from some of the letters I get we are considered magicians, or worse still — robots. So say if you speak of Los Alamos that we don't wear magicians' hats, neither do we have electronic brains in our heads, nor Geiger counters in our bosoms. We are not monsters, No, Sir!

107. One gets used to it. Habit... you know

136 A Mexican worker in Imperial Valley "At home we must pray for rain. Here they have only to phone 'central' and the water streams in!.

160 The devil has many names, and in this century he likes to call himself Mr Profit or Mr Efficiency..

178 Thomas J Watson of Endicott — referred to as the greatest salesman in the Universe — He who is not always

getting better stops being good.

183 Mr Watson and other thinking machine producers declare "Our machines free the human spirit by relieving it of routine labour. Time is gained in this way for creative intellectual work". Similar promises were made when the first big machines for the conquest of physical drudgery appeared. It was claimed that man would be freed from the fetters of labour. But in reality only the nature of the labour changed. The working man of today has less need to exert his muscles, but in dealing with the mechanical slaves his nerves and spirit are put to new and severe tests. The work is changing its character lost its personality and dignity.

236 The American pedagogue Dr Abraham Flexner is the spiritual father and founder of the Institute (for Advanced Studies, in Princeton): He found wealthy patrons in the Dept-Store owner Louis Bamberger, and his sister Mrs Fuld.

237 Oppie had directed the constr. of the 1st atom bomb during the II. world war, and thereby, in his words "~~sinned~~ sinned against the spirit of science". After the war he declined a reappointment from the Govt & went to Princeton "to work for the preservation of the good things for which man lives"

"We scholars were apostles, and have become bishops" — von Neumann "We made pacts with the mighty and let ourselves be harnessed by them for their own ends."

239 Certain members of the Institute have come out openly with critical and warning notices, only to be misunderstood, attacked, outlawed, or worse still — made use of.

"What are we working on?" said a member of the Inst. "I suppose on the real foundations of tomorrow. All that you have seen in America in the way of technical development is not what is to come but what is already passing. It rests on the basic thoughts mainly conceived and set on paper at the turn of the century. This theoretical treasury of ideas is on the decrease. New and true thoughts must be found for the practice of tomorrow.

We are not, thank God, the only place in the world where creative work is being done

Robert Jungk was 19, a Jewish student in Berlin when Hitler came to power. His father was a writer + his friends & relatives felt strong in their old fashioned German liberalism

The day after the Reichstag fire was arrested was released. Studied in Sorbonne. Though had been deprived of German Nationality retd to Germany illegally 2 yrs later to work for a subversive press service. Within 14 months had to flee again this time to Czechoslavakia. when Prague fell in 1939 he shifted to Paris. when Paris fell in 1940 went to Switzerland. His doctorate thesis - Zurich - on the ~~resist~~ resistance of the Swiss Press to the censorship of Metternich.

Arrested & jailed in 1943 :: his anti Nazi writings were too strong for neutral nerves"

1944 + 45 central European correspondent of Observer.

'45 was back in Germany.

46 retd from USA to report on Yugoslavia + Hungary. for Swiss papers.

Carl F Gauss by Waldo Dunnington

p. 411 By explanation the scientist understands nothing except the reduction to the least and simplest basic laws possible, beyond which he can not go, but must plainly demand them; from them, however, he deduces the phenomena absolutely completely as necessary — G.

In general I wd be cautious against ... plays of fancy and would not make way for their reception into scientific astronomy, which must have a quite different character. — G.

p. 412 As is well known, the principle of virtual velocities transforms all statics into a mathematical assignment, and by Dalembert's principle for dynamics the latter is again reduced to statics.

Although it is very much in order that in the gradual training of science and in the instruction of the individual the easier precedes the more difficult, the simpler ps the more complicated, the special ps the general, yet the mind, once it has arrived at the higher stand point, demands the reverse process whereby all statics appears only as a very special case of mechanics — G.

All ... new systems of notation are such that one can accomplish nothing by means of them which wd also not be accomplished without them: but the advantage is when such a system of notation corresponds to the innermost essence of frequently occurring needs, each one who has made it entirely his own, even without the equally unconscious inpiriations of the genius, which

nobody can conquer, can solve the problems belonging in that category, indeed can mechanically solve them, just as mechanically as in cases so complicated that without such an aid even the genius becomes powerless. Thus it is with the invention of calculating by letters in general; thus it was with the differential calculus; thus it is also (even though in partial spheres) with Lagrange's calculus of variations, with my calculus of congruences, and with Möbius' (barycentric) calculus. Through such conceptions innumerable problems which are otherwise isolated and ≠ every time demand new (minor or major) efforts of the spirit of invention, become equally an organic realm. — G.

It is the character of mathes of modern times (in contrast to antiquity) that through our language of signs and nomenclature we possess a lever by which the most complicated arguments can be reduced to a certain mechanism. Thereby science has won infinitely in richness, in beauty and in solidity, but as the business is usually carried out, has lost just as much. How often that lever is applied only mechanically although the authorization for it in most cases implies certain tacit hypotheses. I demand that in all

use of the system of notation, in all uses of a concept, one shall remain conscious of the original conditions, and never regard as (one's) property any products of the mechanism beyond the clear authorization. But the usual course is that one claims for the analysis a character of generality, and expects of the other of the results thus produced, ~~but~~ not yet recognized as proved, that it is shall prove the opposite. But one may make this demand only of the one who who for his part maintains that a result is wrong, but not of the one who recognizes ~~a~~ result as unproved a result which rests on a mechanism whose original essential conditions do not tally ~~with~~ in the present case. Thus it is very often with divergent series. Series have a clear meaning when they converge, this clarity of meaning disappears with this condition.

Instead of the above comparison ~~with~~ of a machine, take that of paper money -- This can be used advantageously for great works, but the ~~usage~~ is sound, if I am not mistaken, in being able to convert it at any moment into hard cash. — G.

p 413 It is always noteworthy that all those

who seriously study this science [the theory of numbers] conceive a sort of passion for it. – G.

I have the vagary of taking a lively interest in mathematical subjects only where I may anticipate ingenious association of ideas and results recommending themselves by elegance or generality. – G.

p414. It may be true that people who are merely mathematicians have certain specific shortcomings: however that is not the fault of matters, but is true of every exclusive occupation: likewise a mere linguist, a mere jurist, a mere soldier, a mere merchant and so forth. One cd add to such idle chatter that when a certain exclusive occupation is often connected with certain specific shortcomings, it is on the other hand almost always free of certain other specific shortcomings. G.

p. 416 My young friend, I wish that science would intoxicate you as much as your good Göttingen beer! – G

In my opinion instruction is very purposeless for such individuals who do not want merely to collect a mass of knowledge, but

are mainly interested in exercising their own powers. One doesn't need to grasp such a one by the hand and lead him to the goal, but only from time to time give him suggestions in order that he may reach it himself in the shortest way. G

It is not knowledge but the act of learning, not possession but the act of getting there, which grants the greatest enjoyment. When I have clarified and exhausted a subject, then I turn away from it in order to go into darkness again: the never satisfied man is so strange — if he has completed a structure, then it is not in order to dwell in it peacefully, but in order to begin another. I imagine the world conqueror must feel thus, who after one Kingdom is scarcely conquered, stretches out his arms again for others. G.

p. 417 G was not by any means indifferent to practical applications of his research and to the material value of such applications. But he insisted that the evaluation of scientific work should not be based on such standards. He once said that science should be the friend of practicality and not its slave. In the introdn to his work on magnetism he wrote

"Science, even though advancing material interests cannot be limited by these, but demands equal effort for all elements of its research." D

G used to maintain that mathes is far more a science for the eye rather than for the ear. The eye surveys something at a glance & comprehends it, owing to the splendid language of signs which have been perfected in mathes, as in no other science, esply with refce to the operations to be carried out. On the long road of translation of signs into words, this will never be presented to the ear so precisely that it can be made sufficiently accessible to the listener in order to be pictured by those less familiar with the subject— D.

p. 418 I have a great antipathy against being drawn into any sort of polemic, an antipathy which is increased with every year for reasons similar to those which Goethe mentions in a letter to Frau vol ~~Wolft~~ Wolfzogen† G.

†"in advanced years when one must proceed so economically with one's time, one becomes most annoyed on account of wasted days." Goethe.

"I have the result, ~~but~~ only I do not yet Know how to get to it." In this utterance of G we see above all that he emphasizes a lightninglike intuition. He has possession of a thing, which is, however, not yet his own, and we can only become his Known when he has found the way to it. From the pt of view of elementary logic, this

is certainly contradictory; but methodologically by no means. Here it is a question of Erwirb es um es zu besitzen! This makes necessary a series of further intuitions ~~and~~ along the road of invention + of construction — D.

From chapter entitled Religio Scientiae

p. 298 G's mature philosophy of life was closely associated with his strongly religious nature, which was characterized by tranquility, peace and confidence. - D

All philosophical studies possessed a powerful charm for G's mind. - / "There are questions ~~which~~ on whose answers I wd place an infinitely higher value than on the mathematical, for example concerning ethics, cg on relationship to God, cg our destiny and our future; but their solution lies quite ~~so~~ unattainable above us, and quite outside the area of science." G

By sc. he understood that strictly defined logical structure whose foundation rests on certain truths generally recognized by the human mind, truths which once admitted furnish an immeasurable field of the most complicated researches connected with each other by a strong chain of thought. Therefore he placed arithmetic (i.e. theory of numbers) at the top and in reference to questions ~~of~~ which we cannot fathom he was wont to use the words ὁ θεὸς ἀριθμητίζει, by which he recognized logic as valid for the whole universe, even for those areas where our human

mind cannot penetrate. — D

295 He (G) was always attempting to harmonize his scientific experience with his philosophy of life - D.

One day he (G) said to a friend "that - it - was immaterial to him whether Saturn has 5 or 7 satellites. — there is something higher in the world. - D

p. 300 G possessed strong religious tolerance wh he carried over to every belief originating in the depths of the human heart, — D this tolerance is not to be confused with religious indifference: D

He always emphasised that one is not justified in disturbing the ~~religious devotio~~ faith of others in which they found consolation for earthly sufferings and a safe refuge in days of misfortune — D.

p. 301 G's God was not a cold and distant figment of metaphysics — D

To man is not vouchsafed that fulness of knowledge which wd warrant his arrogantly holding that his blurred vision is the full light & that there can be none other which might report truth as does his — D.

In this world there is a pleasure of the intellect which is satisfied in science & a pleasure of the heart which consists principally of the fact that human beings mutually ease the troubles & burdens of life — G.

p. 305 I must say that so often in earlier times when I saw people of the lower classes, simple manual laborers, who could believe so rightly with their hearts, I always envied them, and now, tell me how does one begin this? — G of Wagner.

"You say faith is a gift-; this is perhaps the most- correct- thing that can be said about- it.

"Of course, faith is a gift-; but- as a rule it is conferred only when one seriously asks for it. Then this gift- is never denied. For there exists concerning it- a promise sublime above all doubts: To him who asks shall be given." - G.

p 309 Yes! The world wd be nonsense, the whole creation an absurdity without- immortality — G.

p. 301 The unshakable idea of ~~personal~~ personal continuance after death, the firm belief in a last- regulator of things, in an eternal, just-, omniscient omnipotent God, formed the basis of his religious life, which harmonized completely with his scientific research — D.

314 We are thankful to Noah for having saved the sprigs of the vine from the flood, even though he would have done better to have turned many other things to the flood — G.

I am most- amazed that you consider a professional philosopher capable of no confusion in concepts and definitions. Such things are nowhere more at home than among philosophers who are not mathematicians G

p.1. During the years 1813–32 Germany was in possession of her three greatest geniuses Goethe, Gauss and Wagner. To be sure the three were in various stages of development. Goethe was in his declining years, Gauss at the height of his fame, + Wagner was not yet in the ascendent. — ①.

p.6 shall pay him - - - - unreminded

12 G could figure before he could talk.
He corrected his father's arithmetic at three!
The whip was recognized ~~as the~~ by great and small of the day as the ultima ratio of educational method, and Büttner felt himself justified in making unsparing use of it according to caprice and need —

13 $1+2+\cdots+100 = 50 \times 101 = 5050$. G explains his method to his teacher as a boy.

$100+1 = 101$
$90+2 = 101$
$51+50 = 101$ hence.

Bartels 1769–1836. His daughter married Otto Struve. was Prof of Mathes. Born in Brunswick

24 G dubbing Kästner †: as the leading mathematician among poets, and leading poet among mathematicians.
† 1719–1800 author of Gesichte der Mathematik 4 vols

27 Wolfgang Bolyai von Bolya descendent of an old Hungarian nobility writing of G.
He was very modest and didn't make much showing. not three days as in the case of Plato

but for years one could be written [illegible] without recognizing his greatness. What a shame that I didn't understand how to open this silent 'book without a title' and read it!

p. 28. It is known to every beginner in geometry that various regular polygons, ~~eg~~ viz the triangle, tetragon, pentagon, 15-gon and those which arise ~~from~~ by the continued doubling of the no of sides of one of them is geometrically constructible.

One was already that far in the time of Euclid, and it seems it has generally been said since then that the field of elementary geometry extends no farther. At least I know of no successful attempt to extend its limits on this side

So much the more, methinks, does the discovery deserve attention --- that besides those regular polygons a number of others, eg. the 17-gon allow of a geometrical construction. — G in 1796 when he was 18. G told Bolya that this polygon of 17 sides should adorn his tombstone. That could not be carried out, since the stonemason Howaldt said that a polygon of 17 sides would be mistaken by every one for a ☺. Hence it was a 17-pted star that was engraved instead.

Tomb of Archimedes bore the fig of a sphere inscribed in a cylinder. Cicero found the tomb buried under rubbish when he was in Syracuse. Jacques Bernoulli from his study of the logr spiral $r = a^{\theta}$ directed that this ~~gr~~ curve should be engraved on his tombstone with the words EADEM MUTATA RESURGO and we

are told that the visitor to the cloisters at Basle may still see the rude attempt of the stonecutter to carry out his wish.

G's companion Bolyai said that no monument should stand over his grave, only an apple tree in memory of the 3 apples, the two of Eve and Paris, which made hell out of earth, that of Sir Isaac Newton, which elevated the earth again into the circle of heavenly bodies - D.

p. 30 When G's mother asked Bolya in 1797 whether G will amount to anything, B replied "The first mathematician in Europe" and she burst into tears. - D

p. 36 "I am staying at Prof. Pfaff's, whom I esteem as an excellent geometer as well as a good man and my warm friend; a man of an innocent childlike character, without any of the violent emotions which so dishonour a man and are widespread among scholars. . . .

The tone among the students as a whole is said to be rather rough: among the professors with whom I have become acquainted there are well-bred men. — G.

p. 38 Gauss wrote a classical Latin giving rise to the expression that Cicero, if he could understand the mathematics of it, would have censured nothing in the Gaussian Latinity. - Cantor

Huyghens, who according to my notion writes the most elegant Latin, and whom I purposely, therefore imitated — G.

p.41 The book (Disquisitiones arithmeticae) is one of the standard works of the 19th cent. and has never been surpassed or supplanted. Not an error has ever been detected in it. But- tho' the character of G's subjects tempts few readers, though his own severe brevity renders these subjects even more difficult than they need be, yet the young reader of Euclid may be brought into contact with G so as to understand the tone of his genius in a manner which would be utterly impossible in the case of Newton, or Lagrange, or Euler — D

G refers to the Duke's understanding of the coherence of all the sciences and to his wise insight which did not deny assistance to those sciences which appear of little use in practical life and are characterized as abstract — D.

p.44 "Mathes" G said "is the queen of the sciences, and the theory of numbers the queen of mathes" If this is true one may continue by calling Disqus the Magna Charta of the theory of numbers.

Lagrange, who was called by Napoleon the high pyramid of the mathematical sciences, wrote to the young scholar shortly after the D- were published: "your D- have with one stroke elevated you to the rank of the foremost- mathematicians, and the contents of the last section (theory of the equations of the division) I look on as the most- beautiful analytical

discovery which has been made for a long time"

Laplace who was the author of the famous Mécanique céleste and before whose impressive greatness everyone in the Paris Academy bowed down is said to have exclaimed: "The Duke of Brunswick has discovered more in his country than a planet- a superterrestrial spirit- in a human body!

Several years later L recommended to Napoleon the Conqueror especial consideration for the universal city of Göttingen because the foremost- mathematician of this time dwells there."

p45 Just as certain clergymen go about with their prayer book, so many a great mathematician of the 19th century was always accompanied by a much-read copy of D, taken from the original volume. Nevertheless it remained a book with 7 seals — D.

The Fundamental Theorem in quadratic residues "If p and q are +ve uneven prime numbers, p has the same quadratic ~~residue q~~ character with regard to q that q has with regard to p; except- when p and q are both of the form $4n+3$, in which case the two characters are always opposite, instead of identical"

G used to call this the "gem" of the higher arithmetic. 8 Gaussian proofs of this theorem are available. Others have furnished 40 proofs.

Newton remains for ever the master of all masters — G.

Astronomy & pure maths are the magnetic poles towards which the compass of my mind ever turns — G.

G to Bolyai – Do apply yourself ~~to~~ somewhat to practical astronomy. It is, according to my notion, next to the joys of the heart and the contemplation of truth in mathes, the sweetest enjoyment which we can have on earth.

p. 68 Sophie Germain again used her pseudonym Le Blanc because at that time a learned woman was hardly taken seriously.

p. 69 You once wrote to me of a Sophie in Paris; if I were your wife I would not be too pleased. Write me more of her – Bolyai to Gauss.

She proved to the world that even a woman can accomplish something worthwhile in the most rigorous and abstract of the sciences and for that reason would have well deserved an honorary degree – G.

"If only everyone accomplished in work what Olbers does in recreation!" – Lichtenberg

Whenever his (Gelpke's) auditors indefatigably asked him as a joking question who were the three greatest astronomers, he named Kepler and Laplace: his modesty forbade him to name the 3rd. — I.

Statesmanship was once described as "The art of the possible"

The finest and noblest province of the world – Marco Polo about Madurai

p. 139 G called attention to the fact that the Univ. of Göttingen had always adhered to the view point that it was not merely a school for the instruction of students and a preserver of scientific knowledge but also a centre for participation in the development

and extension of the sciences as common property of humanity. He also called attention to the fact that the Roy. Soc. of Sciences in Göttingen was established with the last named purpose in view — D

He (G) went on to state that the new physicist (who was to take the place of Tobias Mayer) must lecture to students of varying background and preparation, that he must be able to illustrate his lectures by means of well-executed experiments, that he must be well versed in all parts of physics, and that he must be well trained mathematically. G felt that the degree of mathematical knowledge should not be a measure of one's value as a physicist. On the contrary he spoke that a physicist who was a mathematician of top rank might not be the best professor of physics, at least he might not meet the needs of his students. G stressed the fact, however, that a thorough physicist in the full sense of the word must be well grounded in the higher branches of mathes. — D

Ewald (Heinrich August von) 1803-75, G's son-in-law was the first to teach Sanscrit in Göttingen; author of the monumental History of the People of Israel.

p186 In a letter to Gerling G compared the short memoirs of Lobachevsky, which he could

read in the original Russian, to "a confused forest- through which it- is difficult to find a passage and a perspective ~~titt~~ without- having first- gotten acquainted with all the trees individually" — On the other hand he praised the conciseness and the precision of the Geometriche Untersuchungen. He repeated this praise in a letter to Schumacher dated Nov 28, 1846 and stated that- L had taken a path different- from his own, but- in a masterly fashion and in a genuinely geometric spirit- He got ~~of~~ "exquisite enjoyment" from reading it"

In the letter to Schumacher he continues "you know that- I have had the same conviction for 54 years (since 1792), with a certain later extension which I do not want to mention here". It- is not- known just- what- this "later extension" was Possibly he granted full equality to the geometries yielded by the sign of the measure of curvature. His pupil later developed the thought- that one need only conceive space as an unlimited, ~~and~~ not as an infinite manifold — D

p. 188 When Johann Bolyai reported to his father on Nov 3 1823 about- his discoveries the latter urged him to hasten publication because "many things have an epoch simultaneously when they are found in several places," just- as in spring violets come to light- in several places." We know today how right- he was — D

p. 205 When G asked his grand child "what- do you

expect to make of yourself?", young Carl replied "Well, what do you expect to make of yourself?" Then the old man patted the child's shoulder & said smilingly "My boy, I am already somebody."

p. 206 Having been commissioned by the Czar of Russia to paint an oil portrait of Gauss for the Pulkova observatory, Christian Albrecht Jenson (1792-1870) of Copenhagen arrived in Göttingen during the summer of 1840. G himself & others, except Schumacher, were highly pleased with it. Three copies of it, one belonging to Sartorius, were kept in Göttingen A ~~latter~~ later copy by Biermiller hangs in the observatory today, and the present biographer (I) has an exact copy by J. H. Landry. It is the best-known portrait of G and has been frequently reproduced. Arrangements with the Czar were probably made by Struve. Gauss had these words of Edmund in Shakespeare's King Lear placed under it as his motto:

"Thou, Nature, art my goddess; to thy laws
my services are bound"

Act I, Sc II The word "law" was altered to "laws"

p. 214 "you are entirely in error if you believe I mean by that only the last polishing in relation to language and elegance of presentation. These cost comparatively only an unimportant expenditure of time; what I mean is the inner completeness. In many of my works are such points of incidence which have cost me years of meditation, and in whose later presentation concentrated in a small

space nobody noted the difficulty which must first be conquered" - G.

p. 214 "But the wasps whose nest you stir up, will fly around your head" G.

p. 217. The manner of presentation in the Disquisitiones (arithmeticae) as in Gaussian works generally, is the Euclidean. He sets up theorems and proves them, in which he industriously erases every trace of the train of thought which led him to his results. In this dogmatic form is certainly to be sought the reason for the fact that his work was not understood for so long, and that the efforts of Lejeune Dirichlet were needed to bring it to full effect and appreciation among posterity — Kronecker.

Schumacher proposed in 1833 a new seal for G with the words multa nec immatura, and in 1836 again nec pluribus impar, in place of

p. 218. He was pleased by Abel's work on transcendental functions because he felt that it relieved him of about 1/3 of the labour he had planned on the subject. G praised the elegance and conciseness of A's work, & stated that many of his formulas were like copies of his own. He recognized A's independence by declaring that he had never communicated anything on the subject to any one.

When Arago's works were translated into German a change was made where he discussed the no. of men who were qualified to pass final

judgment on exact researches. The original stated "8 or 10", but the translation by Hankel gave the figure "7 or 8". G was quite pleased, and attributed the change to Alexander von Humboldt. Actually it was done on the advice of Dirichlet.

Archimedes was the man of antiquity whom G esteemed most highly. The only thing for wh he could not pardon him was the fact that in his "Sand calculating" he did not discover the arithmetic of position or decimal system of numbers. G said "How could he overlook that, and what a pinnacle he would now be if A had made that discovery!" —— (1)

p. 219 I place no value on it, except in so far as it is the means, but not the purpose, G.

Georg Julius Ribbentrop (1798-1874) who was in charge of the Univ of Göttingen library, & later became professor of law, was widely known as the best example of an absent-minded professor. One evening he was invited to G's home for dinner. After the meal a severe electrical storm came up & it turned into a long-lasting ~~rain~~ cloudburst. In those days the observatory was some distance beyond the gates of the city. Therese G who was at time her father's hostess invited the guest to stay overnight on account of the long walk home. R agreed but soon disappeared

before the others missed him. After sometime the door bell rang. There stood R in front of his astonished host drenched. He had hurried home to get his necessary sleeping articles for the overnight invitation — (1)

G had promised to show R the eclipse of the moon visible on Nov 24 1834. On the appointed evening the rain was pouring ~~and~~ down, & G assumed that his guest wd not appear. He was so much the more surprised, when the latter, drenched ~~at~~ suddenly stood before him.

"But my dear colleague" G greeted him "in this weather our planned observations of the sky might come to naught"

"Not at all" opined R remonstrating as he triumphantly waved his big umbrella "My landlady has seen to it that this time I did not forget my umbrella"

p. 231 Although conditions of poverty in his youth were severe they did not leave any scar on his later life. At the same time it must be admitted that G was not the ~~severe~~ serene Olympian as he has occasionally been pictured. His wants were simple, and material possessions were sometimes regarded by him as exerting a disturbing influence on scientific work

G regarded maths as the principal means of educating the human mind. He recognised the value of studying classical literature, and said that although he chose maths as a career he

had not neglected the latter. G recommended to his students the study of the ancient mathematicians, in particular Euclid and Archimedes

It was his custom to tell his friends that if others would meditate as long and as deeply as he did on mathematical truths, they would be able to make his discoveries. He said that often he meditated for days on a piece of research without finding a solution, wh finally became clear to him after a sleepless night — D

p. 232 Newton was probably the mathematician to whom G was most closely related by discovery and temperament. To N alone he applied the adjective summus. He occasionally compared N + Leibnitz, and although recognizing the great talent of L. and his merit in discovering the calculus, G regretted that L had dissipated his energy by being too much the jack of all trades.

p. 237 As a youth G had been undecided whether to dedicate his life to philology or to mathes.

p. 238 At the age of 62 G decided that he ought to learn a new language or a new science, in order to keep his mental faculties fresh & to be receptive to new impressions.

p. 246 Like so many Germans he wd gladly have entrusted the fate of his nation to the hand of a strong ruler, and did not wish to adhere to a reed swayed by every passing wind, or a ship without a pilot — D

I have long been accustomed to have a low opinion of the sterling quality of the higher culture which the so-called upper classes believe they can acquire by reading popular writings or attending popular lectures. I am rather of the opinion that in scientific areas genuine insight can be gotten by use of a certain measure of one's own effort and of ones own processing of that offered by others — G.

this was a mild criticism of Humboldt who spent considerable time in delivering popular lectures & publishing popular works. At least G let him know that he doubted the efficacy of the results — D.

p. 250 when Alex von Humboldt returned in 1804 from his American tour and remained in Paris for a time, he found the name of G mentioned with the greatest respect. Before his tour he had never heard the name.

G's career does not show a gradual rise, as in the case of most scientists; it begins at a high pt and continues at that level.

the only man who cd give the Berlin Academy new splendour, Humboldt wrote to the King of Prussia was Carl Friedrich Gauss.

p. 255 A tradition states that Laplace upon being asked who was the foremost mathematician in Germany, replied 'Bartels,'† whereupon the questioner wanted to know why he didn't name Gauss. Then Laplace said "Oh, G is the greatest mathematician in the world

† Ernst Schering's version of the anecdote mentions ~~Pfaff~~ Pfaff instead of Bartels.

~~Brute~~ But the mental make-up belongs to our ego; the creator of our existence has given it to us and we can do little to change it. On the other hand I find in this consciousness of the nothingness of life, wh the greater part of humanity must- in any case expires on approaching the goal (death) that it offers the strongest guarantee of a more beautiful metamorphosis —

Fortem facit vicina libertas sanem — Seneca

For my part I joyously accept all true scientific progress which is made beyond the Rhine and beyond the Channel, but when they commit stupidities over there --- then there is nothing further to be done, except to take no notice at all of it — G.

Several hours with you, dear friend, are dearer than all the sectional meetings of the so-called scientists, who move in such great masses and so gastronomically that there has never been enough scientific intercourse for me. At the end I have always asked myself like the mathematician at the end of the opera, "en dites-moi franchement ce que cela prouve."
Humboldt writing to G in 1837.

In other utterances (of G) one noted the wag --- Laplace also wrote besides his great scientific work on the calculus of probabilities an Essai philosophique sur les probabilités which

found the quickest sale. G had laid the 1st 3 editions on the table and showed us in the 1st edn. a statement that the conqueror only harms his own country instead of helping it, which is missing in the 2nd edn & returns in the following ones. The 1st edn appeared while Napoleon was on Elba, the 2nd during the 100 days, further edns followed in measured intervals — Cantor

G disliked even the taking of notes. Once when we wanted to take notes, he said "Dispense with writing here, and pay better attention" - Cantor.

He has made the impossible possible -

p.266 After his memory failed Weber used to express frequently the desire to return to Göttingen, and when he was told that he was actually in Göttingen, there came the answer "No, that is not the Gottingen of Gauss — D

As he (G) grew older he became more and more convinced that maths cd be studied from books without a teacher — D

p.267 Distinguished mathematicians profited by his writings, but perhaps only one of them ~~profited~~ enjoyed the intimate relationship of pupil to teacher. This was Bernhard Riemann, and as a matter of fact he was already at the level of a master. Probably one shd include Eisenstein, and Dedekind, on this list with Riemann. — D

Wachter in his "vita" for the Gottingen faculty expressed thus his purpose in study: "not to burden the memory with many things, but to recognise the

true reason of scholarship and to sharpen the intellect and to train judgment."

p. 268 During his stay of several years in Göttingen von Staudt felt that he was not only benefitted by ~~his~~ the master's teaching, but also gladdened by his recognition and praise. Whenever von S handed G his solution of an assigned problem, G would give the student his own solution, with the joking remark that he counted on mutual satisfaction — D

p. 269 In the foreword to the first edn of a text-book on higher geometry, Lübsen wrote "Theory, said my revered teacher Gauss, attracts practice as the magnet attracts iron —

270 In the Gauss Archive there is a letter from a high official to G in wh Schnürlein is discussed, and these words occur: Für Schnürlein sind Sie der liebe Gott.

273 Humboldt in writing to Schumacher about Jacobi on July 3, 1844 made the following statement: "He is serene and miles gloriosus, recognizing in the triumvirate only two besides himself, Gauss & Cauchy — tout le reste lui paraît de la vermine. I dont like these exclusions"

When Hansteen sent Abel's memoir on elliptic transcendentals to Schumacher with the request that he print them in his journal as soon as possible, he told S that when he handed Abel the last no of Astronomische Nachrichten, the latter became pale and had to run to a bar and take some strong liquor to overcome his excitement. Abel felt that his method, which

he had discovered several years previously was general and more comprehensive than Jacobi's theorems. Abel feared that G would publish before he did. In recounting this incident by letter to G on June 6, 1828, S added "When you publish your researches it will probably cost him even more liquor."

Bache (Alexander Dallas - 1806-1867) served as director of the U.S. Coast and Geodetic Survey: was a great grandson on Benjamin Franklin.

Writing to Gerling on June 23, 1846 & discussing Eugene's business interests, G stated "Life in America is capable of ~~awaking~~ waking talents which wd never emerge in Europe"

p. 291 ~~Hch~~ Humboldt writing to G in 1810 inviting him to Berlin "You are in no wise obligated to teach courses, you are only requested to lend your name as a full professor to the new university and, as much as your leisure and health allow, to teach a course from time to time." In an accompanying private letter as you desire, he added "At the University I release you, from every obligation, and there is nothing that cd impede you on the path of quiet, secluded, and peaceful research"

p. 295 And for 4 years, a week has seldom passed when I would not have made one or another vain attempt to solve this problem — recently very lively now again. But all brooding, all searching has been in vain, sadly I have had to put down the pen again every time. Finally I succeeded several days ago — not as a result of my tedious searching but by the grace of God, I might say. The puzzle was solved

as lightning strides; I myself wd not be able to show the guiding thread between that which I previously knew, that with wh I had made the last- attempts — and that by wh I succeeded. Strangely enough the soln of the puzzle now appears easier than many other things that have not held me up as many days as this has years, and certainly nobody will have any idea of the long squeeze in which it placed me, when I someday lecture on this topic — G.

G stated in several places that valuable insight- on problems came to him upon waking up. His discovery of the inscription of the regular polygon of 17- sides falls in this category, and in his collected works (V 609) he wrote that he discovered the laws of induction on Jan 23 1835 at 7 A.M. just before getting up. Descartes and Helmholtz ~~have~~ also testified to the great- value of such early morning thoughts — D

Kästner had a very eminent native wit, but strangely enough he had it in all subjects outside of mathem., he even had it- when he talked about mathes (in general) but was often completely deserted by it- inside mathes. — G.

Emil du Bois-Reymond called G "a grand master of thought"

Jerome K Jerome

1. I have played every part in Hamlet except Ophelia
2. We drink one another's healths, and spoil our own.
3. Being poor is mere trifle. It is being known to be poor, that is the sting
4. One of the advantages of being poor is that it necessitates the cultivation of virtues.
5. [He also believed in idleness and knew that it was impossible to enjoy idling unless one had plenty of work to do.]" there is no fun in doing nothing when you have nothing to do
6. [He enjoyed the life and work of a writer, but thought that his writings would not elevate a cow.

Prior Let him be Kept from paper, pen and ink
So he may cease to write, and learn to think

They are only incidentally interested in the military overtones of their science -

If you mess up the ocean with atomic waste, you mess it up for thousands of years — Columbus Iselin.

Woods Hole and its Pacific counterpart The Scripps Institution of Oceanography.

Once asked what he (Confucius) would do first if the country's administration were left to him the Master replied he would correct the language." If the language is not correct then 'what is said is not [A] what is meant'; if ..A.. then what ought to be [B] done remains undone'; if ..B.. 'morals & arts [C] deteriorate'; if ..C.. justice [D] goes astray'; if ..D.. people stand about in helpless confusion.

From Hertz's collected works.

Newton in his letter to Bentley 25th Feb., 1692

That gravity should be innate, inherent and essential to matter, so that one body may act upon another at a distance through a vacuum without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it.

Matter cannot act where it is not.

Hertz in a letter to his parents 1st Nov 1877.

I have not forgotten what I often used to say to myself that I would rather be a great scientific investigator than a great engineer, but would rather be a second-rate engineer than a second rate investigator. But now when I am in doubt I think how true is Schiller's saying "Und setzt Ihr nicht das Leben ein, nie wird Euch das Leben gewonnen sein" and that excessive caution would be folly.

Hertz in a lecture entitled "On the relations between light and electricity" delivered before the German Assn for the Advancem't of Natural Sc & Medicine in Heidelberg on Sep. 20, 1899.

"All the more must we admire the happy genius

of the man who could connect together these apparently remote conjectures in such a way that they naturally supported each other and formed a theory of which every one was at once bound to admit that it was at least plausible. This was an Englishman — Maxwell. You know the paper which he published in 1865 upon the electromagnetic theory of light. It is impossible to study this wonderful theory ~~of~~ without feeling as if the mathematical equations had an independent life and intelligence of their own, as if they were wiser than ourselves, indeed wiser than their discoverer, as if they gave forth more than he had put into them.

Hertz's speech on Helmholtz's ~~b~~ 70th birthday. Scientific investigations have a beauty of their own, which can be enjoyed as well as understood; but in order to enjoy it a man must understand the investigation, and steep himself in it. Take one of H's minor researches, eg. the theoretical paper in which he discusses the formation of liquid jets. The problem is not one that appeals to the lay mind. Its solution is only attained by the aid of assumptions which correspond but indifferently to the actual conditions; the influence of the investigation on science and life can scarcely be called other than slight. And yet the manner in which the problem is solved is such

that- in studying even a paper like this we feels the same elevation and wonder as in beholding a pure work of art. Upon our comprehension of the difficulties to be surmounted depends the depth of this feeling. We see a man of surpassing strength spring across a yawning chasm, apparently without effort, but- in reality straining every nerve. Only after the leap do we clearly see how wide the chasm is. Instinctively we break into applause. But we cannot- expect the same spontaneous enthusiasm of spectators from whose standpoint- the chasm is not visible, and who can only learn from our descriptions how trying the feat was.

... His scientific life interests us like an Odysseus, through the whole region of exact- investigation. He began as a doctor: he had to study the laws of that- life which he wished to succour, ~~which~~ and this led him to the study of physiology which is the scientific part of medicine. He found himself hampered by the gaps in our knowledge of inanimate nature. So he set- about filling these, and thus drifted more and more to physics. For the sake of physics he became a mathematician, and in not

to probe thoroughly into the foundations of mathematical Knowledge, and Knowledge in general, he became a philosopher. When we look through the technical literature of any of these sciences we meet his name. Upon all of them he left his mark.

--- In the case of purely mechanical systems it has long been known that every system according to the conditions in which it is placed arrives at its goal along its shortest path, in the shortest time, and with the least effort. This phenomenon has been regarded as the result of a divine wisdom: its general statement in the region of pure mechanics is known as the Principle of least Action. To trace the phenomenon in its application to all forces, through the whole of nature, is the problem to which Helmholtz has devoted a part of the last decade.

Kelvin in his introduction to the English translation of Königsberger's biography of Helm:

The professional career of Helm. was unparalled in the history of professions. He was

Military Surgeon in the Prussian army 5 years
Teacher of Anatomy, Academy of Arts, Berlin 1 "

Prof of Pathology + Physiology in Königsberg		6 yrs.
" " Anatomy in Bonn		3 "
" " Physiology in Heidelberg		13 "
Physics in Univ of Berlin		17 "
Director of Physikalisch-Technische Reichsanstalt		6
		51 yrs.

Whoever comes in contact with men of the first rank has an altered scale of values in life. Such intellectual contact is the most interesting event that life can offer — Helmholtz

He showed (in a paper in 1843) (and the clear and precise wording is of especial interest in view of the great discovery of Pasteur at a later time that putrefaction can occur independently of life, but that it offers a fertile soil for the development of living germs, and is modified in its aspects by them. Fermentation is one such putrefactive process modified by organisms and correlated with them. It strikingly resembles the vital process in the similarity of substances that it attacks, in its rate of growth, and

the similarity of the conditions determining its continuance or check — Königsberger

Personally I am sorry that you (Hertz) are not coming to Berlin, but as I have told you I believe it is for your own interest to go to Bonn. Those who have still much scientific work in view are better away from the cities. At the end of one's life, when it is more a question of utilizing the points of view one has arrived at for the education of the coming generation and the administration of the State, the case is different — Helmholtz.

History of Sc in Manchester : J.G. Crowther : Bull Inst-
Phys. Nov 1960

Every billet has its bullet — Balfour Stewart

His (Osbourne Reynolds's) scepticism of conventional ideas reached sublime heights. He maintained the general thesis that when a scientist of established reputation has the whole scientific world against him, he must be right = a tradition which seems to have been very fruitful in Manchester. He hated easy agreement, and he carefully brought-up his son to do the opposite of everything he told him to do.

There is more in Planck than meets the eye —
Rutherford.

when his determ:n of the charge of an α-part. $4{\cdot}65 \times 10^{-10}$ agreed closely with P's deduction 8 yrs earlier. He had been ~~predi~~ hitherto prejudiced against the quantum theory.

As Bohr once remarked "Rutherford is not a clever man; he is a great man."

R about Bohr's early idea of the structure of the atom: "He (R) found the mixture of Planck's ideas with the old mechanics makes it very difficult to form a physical idea of what is the basis of it all"

regarding B's theory of H spectra "very ingenious & seems to work out well"

Notes & Records R.S. June 1960 Lord Chandos

A certain Bishop of Hertford of the last century "Thank God I have had a classical education, and don't even know how a pump works!

In honesty I must say that this opinion is shared by no one else.

I suppose, if I was an adroit politician, like many around me, you would expect me to say --

The boys who elect for Science have rather a bigger grounding in the humanities than their classical fellows have in the sciences, and this is because some sorts of ignorance are permissible, and that there is a snobbery of ignorance all its own.

.... lays some claim to cultural superiority from the very fact of his ignorance

In the ombre des jeunes savant en fleur there a certain number of ~~was~~ weeds which do seem to thrive

The advance of science and the increase in the use of machines must inevitably lead to a society which can make all its wants, all the essentials and most of the amenities with an almost microscopic force of work people. In such a society productive work, in the sense in which we now use the words, when not regd will have the most terrible consequences As my late colleagues know very well, such unwanted

production would unbalance the economy, deflate the currency, depress land values, lead to wasteful and embarassing circumstances, and worse still to parliamentary questions and even votes of censure and all the rest of it.

the Royal Soc in whose ranks are many who are the founders of this "Leisure revolution"

Once he has learnt to recognise the authentic voice of the masses, which I think is the greatest gift that education confers, he can retire from the shop floor or the board-room or the ~~committee~~ counting house, to the fulfilment and not the frustration of his life —

Sir Cyril Hinshelwood.

There is still too much support for the theory that the administrator is a wise man, unprejudiced by any real inner comprehension for science, who can use effectively the man of science as an instrument like a spade, which he has bought to dig with in his garden. About this two things can be said. In the first place no body is ever worse off for knowing what his great wisdom is being exercised on. Secondly as to using instruments, you can go out and just buy a spade. On the other hand you do not usually just buy a violin and begin to play it: the neighbours might object.

If And if I may say so without lack of due modesty, men of science are a bit more like violins than like spades. (If any one doubts this, I suggest that he re-read the famous scene of Hamlet, Guildenstern and the recorder.)

One can not insist too much that science can not be carried piecemeal to the top. It must be built in there. This has been said many times, with varying degrees of subtlety and urgency, perhaps hitherto the point has been put with too much delicacy. I must confess myself to a taste for nuances and half tones, but I notice that they are out of fashion. Hard primary colours are popular in decorative motifs. I heard an angry young scientist say recently in the modern idiom that the time is rapidly approaching when it will be the duty of any patriotic man of science to refuse his cooperation in concerns where science is not properly represented at the highest levels. I said "No, no, my boy, you must not talk like that." I should prefer a gentler idiom myself. But I am quite convinced ....

Short range solutions are specious.

What happens occasionally reminds me of a situation I used to meet as a college tutor, when a certain kind of undergraduate, now rare, would come to me and

more or less say: "I have done no work for three years. There's my final examination at the end of this term. What are you going to do about it?"

The real life blood of pure science is inspiration, and we have to see to it that this is not destroyed by the machine. We must have organization, but we must also have freedom. When in doubt let us err on the side of freedom.

Do you remember the nightingale in the wonderful Hans Anderson story? It had saved the Emperor's life. But when invited to live at court it refused. It said, however, that it should always come and sing at his window when the Emperor wanted it. That is what the Royal Society should do. It can sing at Lord Hailsham's window when he likes. But I don't think it should live ---

-- we should live up to the hopes of our Royal founder.

J.A. Malik Soviet Amb' in U.K.

I think it appropriate to recall that the word diploma came into use at the dawn of civilization when diplomas were presented to envoys for the same purpose for which credentials are issued today. And incidentally that is where the word 'diplomacy' comes from.

Quoted by Pyke from "The scandal of Father Brown" #67
The point of a pin" By G.K. Chesterton

Father B laid down his cigar & said carefully
"It isn't that they can't see the solution. It is
that they can't see the problem"

He dubbed him 'Everybody's conscience'

Good ideas would prevail, he believed, if promoted with what he termed 'ferocity of purpose'

To Geoffrey Pyke the most beautiful thing in the world would always be pure research — open minded study for the sake of improving man's collective knowledge —

Zuckerman, Bernal and Pyke formed what was described as 'Mount-batten's circus'

Lord M labelled such farfetched ideas 'Pykeries'

In spite of my somewhat petulent telegrams I have not lost faith in you.

It may be gold; it may only glitter. I can't tell. I have been hammering at it too long, and am blinded.

No idea is a good one which does not breed its own successors.

Many of the descriptions of Mount-batten are merely lazy attempts to foist on the public a stock figure from the wax works — clothed in readymade downs from the nearest literary rag-bag. Thus an American spokesman

alleged to have said 'the new Supreme Allied Commander is a man of action not words.' Nonsense! He talks his head off, like most men of action and virility, and all day long - Pyke.

True he is rich, and his wife richer. But he worked through the money-spending phase 10 to 20 years ago, and now he has the right attitude to money: that he wants enough to be able to ignore it.

True he is of foreign descent. But no man is more — one might say more damnably — English.

To him new ideas of all kinds, technical & social, are a delight. Few men are so open-minded to them. He is afraid of cranks only because he fears he may fall for their notions.

Hitler is his own explanation for everything. The question asked so characteristically by the Victorian Epoch "Why should we do anything for posterity? What has posterity done for us?"

The real obstacle to advance were not technical but essentially of an intellectual