

Xenakis - a music for the future

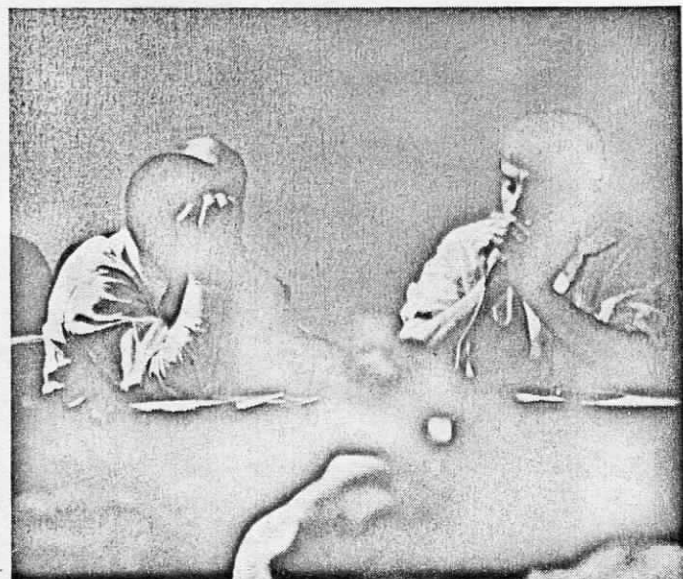
MAURICE FLEURET

HE CANNOT ANY LONGER BE DISMISSED in three lines, nor his works conveniently lumped together with the wild avant-garde. Iannis Xenakis is not a young man; next month he will be 50, the age at which Alban Berg died. He is an established figure who, over 20 years, has produced some 40 scores of such originality that despite frequent imitation they remain inimitable. During the last seven or eight years his music has been played everywhere and recorded almost complete. Béjart, Roland Petit and Balanchine have used it for ballets. The composer himself has been all over the world, booked to appear at the festivals of Royan and Ypsilanti, at the expos in Montreal and Osaka, at the Collège de France which houses his 'Centre of Mathematical and Automated Music', as well as at the University of Bloomington, Indiana, where he lectures. Iannis Xenakis is nothing less than a prophet in the desert.

It was not always so. In October, 1955, at Donaueschingen a progressive public, well accustomed to experiment, demonstrated violently against what it considered the monstrosity of his cataclysmic *Metastasis*, first released on the public by a courageous Hans Rosbaud. Now, however, enthusiastic crowds fight to get in — to the Xenakis Journées in Paris, the *Entrée Libre* chez Xenakis in Royan and to every premiere in Venice, Lucerne, Avignon or Persepolis. For today's young generation, questioning established values, rejecting social conventions, the music of Xenakis affirms a fury necessary in life and thought. By fusing science with art for the purpose of human expression it appears for many a symbol of the new consciousness of the age. It is almost possible to consider the ideas of Xenakis like those of Marcuse.

Over the last 17 years many things have changed. After a stifling era when the necessity of serial composition was unquestioned, Western music has come up for air. The myth of total serialism has been exploded. Music since Webern

Xenakis at the Journées, 1968



Isabelle Armand

has grown progressively more flexible. Chance elements have been used to expand closed structures. Electronic modulation of sounds has coupled with *musique concrète*. Mixed media and collage have put about a facile humanism. Expressionism and romanticism are back in force. Yet Xenakis owes none of his success to these fashionable developments, for he has worked quite independently of them and thus has escaped the academic dictates of yesterday's system as of today's. His art has won through in the end, without compromise, without diversion, without trying to please, without concession to popular taste, simply because its bald honesty, springing *de profundis*, was bound sooner or later to be recognised.

Many composers strive to fracture the tradition, to banish it, to subvert it deviously; but such attempts at new music defined against the shadow of the past (and thus negatively) only re-emphasise the crushing weight of tradition. Xenakis, on the other hand, invents absolutely, like Adam in the Garden. His creation does not relate to received culture at all, and he does not try to be original at any price: he *is* original. Which explains his power of direct and instant communication, permitting the listener 'to go into the building as a living stone' and thus to grasp from inside with no linguistic problem the multiple perspectives governed by the science of numbers.

Caught in the loudspeaker maelstrom of *Bohor* or in the huge musical turbine of *Nomos Gamma*, the unsuspecting listener is plunged into a web of sounds, bewitched, submerged, elevated, with no time to understand what is going on. It is an immense geological noise broken by storms and eruptions, streaming with lava, streaked with lightning: a brute sound like those natural phenomena which continue to hold for the composer a strange fascination — wind, hail, storm, earthquake, tide and the great shift of stars in the firmament. (Each summer Xenakis spends some weeks in the isolation of the Corsican coast, sailing and studying nature and astronomy.) From this musical tumult there mounts a great profound cry. It is the holy fever of *The Rite of Spring*, the awesome eloquence of Berlioz's *Requiem*, something from the bowels of creation, something stronger than death, something that resembles a paroxysm of light. 'The ear does not hear. It is the mind that hears', says the composer. Nevertheless this enormous machine of vibrant space is in the highest degree pre-determined. 'The hard core, the thesis behind this composition, is the organisation of groups of sound elements by a combinatory process both free and finite'. To appreciate this is to lose none of the Dionysiac intoxication it induces, for it is not concerned with deploying an argument according to certain linear dynamics or causalities, but with the movement of organic masses which must be at the same time lived in and totally embraced from without.

One will not best come to terms with the works of Xenakis by hearing them chronologically, because his art has remained in a sense static, true to a constant essence despite many changing facets. It is not evolutionary, progressive in its laborious exploration of profundity, systematised in development. Always, radical conquests have pioneered new horizons while retaining 'the same perspectives: 'the problem is not



Photo Mail

At Persepolis last year

the historical justification of a new adventure; on the contrary it is the enrichment, the leap forward, that counts', to quote the article *Musiques Formelles*. With Xenakis there is no gradual accumulation of vocabulary, no storing up of characteristic and singular idioms, no patient perfection of a definitive syntax. In fact properly speaking there is no language in the sense of a system of communication given once and for all, and no separation between form and content on either hand, but at all levels we perceive a compact imperious mind finding quite natural expression by sole virtue of its power. Thus the plagiarists of Xenakis, who have reproduced his surface, have never rendered his spirit, never created its unarguable inevitability. This may be observed with Penderecki as with Lukas Foss.

If one must look for antecedents of this unique body of work, one would not find them in a particular epoch, school or past master. One might suggest Pythagoras, Leonardo, Monteverdi. One might indicate the renaissance humanists, the 17th-century encyclopædists or Edgard Varèse. Better still one might consider primitive rites, gratuitous abstract constructs, all that witnesses to whatever surpasses Man, that he exhausts himself pursuing and analysing. For the sonorous physics of Xenakis' music bears witness to an eternal philosophy outside time and space. So foreign is he to particular historical or geographical circumstances that the 'Xenakis' phenomenon might as well have occurred in some other civilisation or century than ours. We may well question how Xenakis escaped all our heritage, and on what he based a music which speaks so precisely to contemporary sensibility and which, despite its use of the latest technological refinements, remains nevertheless a 'music for all time'.

Iannis Xenakis was born Greek, but on the banks of the Danube at Braïla in Romania. Folk music, such as Bartók at the time collected, coloured his childhood, together with Orthodox liturgical chant for which he has retained a lively predilection and which later permitted him to recover and

study the great tradition, today almost forgotten, of Byzantine music. His first teacher, Aristotle Kundurev, himself a disciple of Ippolitov-Ivanov, encouraged his assimilation and deep consciousness of these two fundamental sources. Xenakis states that, of the past, he is primarily interested in the arts of the Golden Age: matter which may seem to us hard, rough and petrified at first, then time-worn, and now approaching the accidental quality of a natural outcrop. He admits only the remotest purest examples, notably spontaneous folk arts as in oriental civilisations many millenia old, Mediterranean antiquity and the Middle Ages.

At ten he left Romania with his family for Greece, and continued his education in a private Anglo-Greek college on the island of Spetsai. There he discovered the great European classical and romantic repertoire, particularly Brahms and Beethoven to whom he has remained attached. There also he developed his extraordinary knowledge of antiquity, an essential factor in the growth of his personality. Many of the titles of his works, right up to the present time, make subtle etymological references to men, events or discoveries in antiquity; indeed he has composed incidental music for such ancient theatrical masterpieces as *The Suppliant Women*, the *Oresteia* and *Medea*. His historical erudition, however, is not in any way prompted by nostalgia. Rather his familiarity with antique theologians, philosophers, scholars and artists has driven him constantly to seek in the present the secret but eternal thread which links all things. It has, little by little, forged in him that spirit of synthesis through which he can stand back, when confronted with a novel situation, and resolve it by generalisation at the highest level, rather than be blinded, like so many others, by the proximity of the problem. It has permitted him, in sum, to reconcile the artist and the scientist within.

He shortly undertook highly advanced scientific studies at the Athens Polytechnic, whence he graduated in 1947 with an engineer's diploma. He then became fascinated with advanced mathematics, without on this account renouncing the musical vocation which he had felt and developed from the age of twelve, and concentrated on the application in the field of architecture of mathematical calculations of the resistance of construction materials.

At that time Greece was torn by civil war. Xenakis, as a student, took part: at first perhaps in reaction against his background, then very soon from deep conviction. For five years he was engaged in the resistance against the Nazis. He got to know the maquis, battles on the streets, fighting in the countryside, assassination bids, prison and internment camps. On New Year's Day, 1945, he was seriously wounded in the face, losing one eye. Then he was captured and condemned to death, and after managing to escape abandoned for ever a country given over to despotism. On the way to the United States he stopped in Paris, and did not leave — which takes us up to the end of 1947.

The composer has retained from this dramatic period of his youth a certain militant fervour and genuine feeling of solidarity with all oppressed minorities. Several of his dedications proclaim this openly — above all *Nuits*, that great searing cry for twelve mixed *a capella* voices: 'For you, obscure political prisoners, Narcisso Julian since 1946, Costas Philinis since 1947, Eli Erythriadou since 1950, Joachim Amaro since 1952, and for you, forgotten thousands whose very names have been lost'. Although one cannot ascribe to him a commitment as political as Nono's or Henze's, Xenakis is continually a witness — both in his works and in the positions he adopts — to justice and tolerance.

Furthermore one can perceive in his music — and on his own admission — the immediate echo of battle: the heavy grinding of tanks, the report of automatics, the whistling of

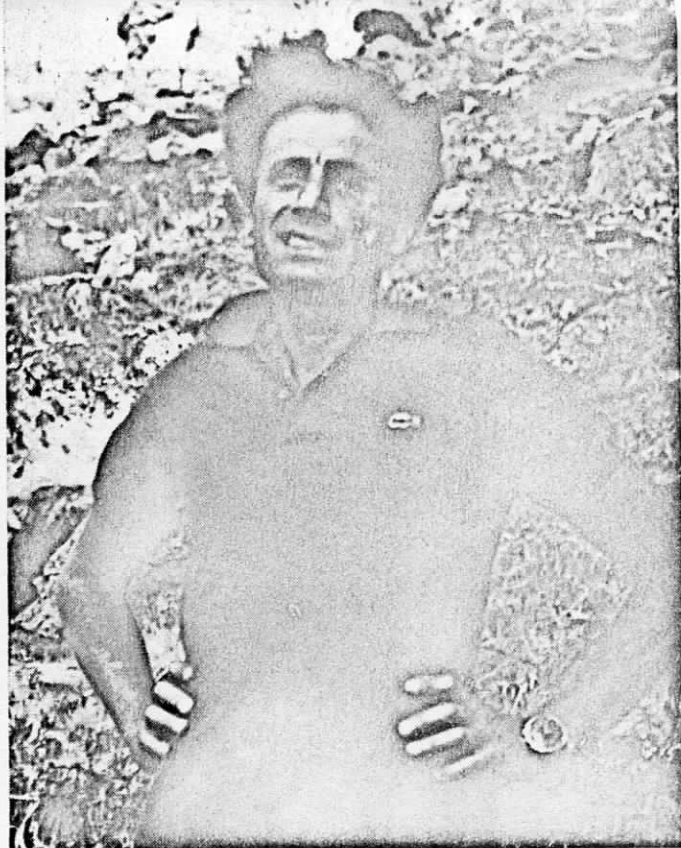
tracer bullets, all the explosions of the Apocalypse. It is rather as if his born musician's ear had straightway seized upon these sonic assaults to defuse them, exorcise them and transmute their substance.

In Paris Xenakis was to live in extremely difficult material conditions. Nevertheless he continued his musical apprenticeship, benefiting from the innovatory fervour with which French artistic circles were throbbing immediately after the war. In 1948 he was to be seen with Honegger, then with Milhaud. In 1950 he showed one of his earliest scores to Messiaen, who approved his rejection of folk-lore, neo-classicism and all forms of academic prescription, and immediately accepted him for the course in Musical Aesthetics and Analysis that he was giving at the Conservatoire. For Xenakis, as for many others, Messiaen was to be the supreme teacher, both through his ideas and by precept: 'he was using then in his music a combinatory system, which is to say connections that seemed at the time very complex between durations, intervals, dynamics and articulation; he did not use formulas, but his direction and his mind were mathematical' (*Conversation with Jacques Bourgeois*, Boosey and Hawkes, 1968).

Apart from René Leibowitz, Messiaen was the only person in Paris quite familiar with and able to analyse the works of Schoenberg, Berg and Webern. However, unlike all other composers of his generation, Xenakis rejected out of hand the Viennese example. Hermann Scherchen, who became and remained his most ardent and loyal advocate, in July, 1955, published in the first issue of *Gravesaner Blätter* a revolutionary article by Xenakis on 'The crisis in serial music'. In it the system was attacked at 'its two bases which contain in embryo the germ of their own destruction and replacement: the series and polyphonic structure' for 'linear [serial] polyphony is destroying itself by its present complexity. What one hears is, in reality, only piles of notes in various registers. The vast complexity prevents the listener from following the entanglement of lines and has as its major effect an irrational and fortuitous dispersal of sounds over the whole range of the sound spectrum. Consequently there is a contradiction between the polyphonic linear system and the heard result which is surface, mass. This contradiction will disappear when the independence of sounds is total. In fact linear combinations and their polyphonic superimpositions having ceased to operate, what will count will be the statistical mean of the separate states of transformation of the elements at a given moment. The overall effect will then be able to be controlled by the average of the movement of a given number of selected sound objects. This results in the introduction of the notion of probability, which implies further in this particular case the calculation of a combinatory system ...'

This is clearly the reasoning of a man used to the manipulation of matter more resistant, less vague, than sound, one accustomed to organising it according to intrinsic physical laws rather than forcing it to conform to some more or less arbitrary speculation. In fact, shortly after his arrival in Paris, Xenakis obtained a post making engineering calculations for Le Corbusier. Until 1960 he was to work alongside this illustrious architect and cooperate closely in the building of housing estates at Marseilles and Nantes, the convent at La Tourette, the Assembly Hall at Chandigarh and the Baghdad stadium project. In 1958 he was to conceive by himself the revolutionary architecture — the first *volumetric* architecture based on hyperbolic paraboloids and conoids — of the Philips Pavilion at the Brussels World Fair, with music by Varèse and interior display by Le Corbusier. Among his present projects there exists the complete model of a 15,000ft-high 'cosmic city', springing from a 25-acre base. He is now working on the sketches of a new 'city of arts' at Shiraz.

H.L. de La Grange



In Corsica, 1969

The first large-scale musical works of Xenakis stemmed from these diverse experiences. Already at the age of 16 he had tried to express in geometric formulas a fugue of Bach. His mastery of mathematics and his fundamental reflections about nature and the perception and organisation of sound led him in 1954 to apply Probability Calculus to the control of masses, clouds, galaxies of sound ruled by the novel characteristics of density, degree of order, rate of change, all things which were entering the pre-occupations of a composer for the first time. Under the name of 'stochastic' music (from the Greek *stochos* meaning goal, target, but also to think, to reflect) he thus applied to complex groups of sound events the law of large numbers, which holds that the more numerous phenomena are, the more they tend towards a particular character.

This is not at all a matter of provoking or soliciting chance, in the style conceived and practised by John Cage and his disciples. Indeed, contrary to so-called aleatoric music, chance is here fixed in a determinist system which puts it totally at the mercy of the creator; instead of replacing the composer it offers him a useful supplementary tool for bringing order to apparent anarchy. The interpreter has neither optional paths, nor any particular choices in material at his disposal. He has neither more nor less freedom than in the past. He remains the translator of a thought perfectly formulated in an organically formalised work.

Metastasis, which begins to explore this method of composition, innovates in four areas:

- (1) The extreme division of parts, as many as there are musicians, that is to say 61;
- (2) The systematic employment of individual glissandi in the whole mass of 46 string instruments — these glissandi determine 'continuously evolving sound-areas, comparable with regulated surfaces and volumes';
- (3) Combinations of structures of interval, duration, dynamic and timbre, according to geometric progressions dictated by the Golden Section;
- (4) 'The placing and correlation by rank of the different

characteristics of sound events with the help of Probability Calculus'.

Further, this key work was for Xenakis 'a first attempt to show that a human orchestra was capable of surpassing in the production of previously unheard sounds and in finesse the new tape music which was supposed to be replacing it.'

With *Pithoprakta* (actions according to probabilities) for orchestra of 50 instruments, first performed in the Munich Musica Viva concerts of 1957, the method refines itself, becomes more radical and creates a really new sonic morphology. The confrontation of continuity and discontinuity is expressed not only by glissandi and pizzicati, but also by tapping with the wood of the bow, by extremely short bow strokes and by slaps of the hand on the bodies of the 46 *divisi* strings. (These were original elements of sound material which an army of imitators would henceforth exploit as tricks of orchestration.) In this granulation of sound of variable density 'the individual noise loses its importance to the profit of the ensemble perceived as a block, in its totality'.

The last of the three works which served as Xenakis' point of departure, *Achorripsis* (jets of sound) for 21 instruments, was first performed in Buenos Aires in 1958 by Hermann Scherchen. This piece, using Poisson's Law, is concerned with resolving the problem of constructing a work 'controlled on a general level by a minimum of compositional rules'.

This new generalising phase showed in more and more complicated calculations. For the score of *ST/10*, planned in 1956, Xenakis finally obtained in 1962 the opportunity to use a 7090 IBM computer. He was thus able to automate his conception by using a programme involving a complex of stochastic laws. The computer was to define each sound of a previously calculated sequence: 'first the moment of its appearance, then its type of timbre (arco, pizzicato, glissando, etc), its instrument, its pitch, the slope of the glissando (if there is one), the duration and dynamic level of the noise made'.

This use of a machine, for which he is frequently blamed by those who do not see that it is only an extension of the pen, has allowed Xenakis to save time and increase the precision of his operations. The computer does not compose. It does what is asked of it and, in the solutions it proposes, the composer furthermore has at his disposal a significant margin of choice. If he wants, he has total freedom to make the most diverse modifications. At the same time this valuable tool gives the musician the opportunity to objectify his conception, and to create a type of composition which 'is no longer the object in itself, but an idea in itself, that is to say a whole family of possible works'. The fetishism of form which has occupied the West since the beginnings of polyphony is here denounced, since 'form has ceased, for Xenakis, to define

itself as a formal scheme: it seems directly related to the state of entropy or non-entropy of the diversity of sound events' (*The Thought of Xenakis* by Daniel Charles, Boosey and Hawkes, 1968).

An essential distance is consequently established between the creator and what he creates, opening perspectives ever broader and more general. From the programme of *ST/10* were likewise to come *Amorsima-Morsima* and *Atrées* still for ten instruments, *ST/4* and *Morsima-Amorsima* for four instruments, and finally *ST/48* for orchestra of 48 instruments, a work which had to wait six years for its premiere in Paris in 1968 at the Journées de la Musique Contemporaine.

At the end of the fifties Iannis Xenakis was to introduce into music, after the Theory of Probability, the Mathematical Theory of Games, under the name of 'strategic' music. *Duel* and *Stratégie*, both for two orchestras are the two works which illustrate it. They leave to the two conductors an area of initiative which is nevertheless bound to the matrix of the game and to the ruling rigorously established by the composer. This time 'the problem of choice is given scope: the choice a man makes depends uniquely on himself, his capacities, his faculties etc.' But the composer is also taking into account, like Pascal or Fermat, that play is one of the principal elements of human activity, able to orientate thought and open new zones to mathematics, science and art.

Beyond its own sonic actuality, then, it can be seen that each work of Xenakis puts forward and supports a specific logical or philosophical concept which is nothing less than a step towards an all-embracing system. With the help of Group Theory, mathematical logic, the Sieve of Eratosthenes and *modulo z* congruences, the art of sounds is thus conceived 'outside time'. For example Xenakis explains, 'a given scale of pitches is a timeless structure because no horizontal or vertical combination of its elements alters it. Yet the event itself, its actual occurrence, belongs to the temporal category. So a melody or chord on a given scale is made from relationships between the categories of timelessness and temporality' (see *Towards a Meta-music*, 1967 in *Musique-Architecture*).

The wish 'to liberate music from this thrall of time' (Daniel Charles) leads to conceiving it as a grouping of relationships of abstract figurations from which stems the new theory of 'symbolic' music, which is at the basis of a fourth group of works: *Herma* (place, foundation, embryo) for solo piano, first played in Tokyo in 1962 by Yuji Takahashi, *Eonta* (beings) for piano and five brass instruments, first performed in Paris by the Domaine Musical under the direction of Pierre Boulez in 1964, *Akrata* (unadulterated) for 16 wind instruments, first performed at the Oxford Bach Festival in 1966 under the direction of Charles Bruck, and *Nomos Alpha*

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H.-L. de La Grange

Off the coast of Corsica, 1968

(rules, laws — but also special melody and sometimes mode) for solo cello, first performed by Siegfried Palm at Radio Bremen in 1966. All these new scores are based on logical operations imposed on classes of sounds. They pre-figure the deduction of an absolute axiom or theorem which itself heralds the era of a 'meta-music' linked with science and philosophy, and making of the composer 'a constructor of philosophical concepts and global architectures'. As far back as *Musiques Formelles* (1963) Xenakis was mapping out this ambitious route: 'Formalisation, axiomatisation, in reality constitute a guide . . . better adapted to modern thought in general. We may at a stroke place the art of sounds on more universal ground, and relate it afresh with stars, numbers, the riches of the human brain, as before in the great periods of antique civilisations. Movements of sounds which provoke in us movements according with them . . . (after Plato) "induce a basic pleasure in those who cannot reason, and a rational delight in those who can, by the reflection of divine harmony in ephemeral movements".'

Not surprisingly such fundamental speculations lead to other intellectual disciplines, and call for group work and complex and expensive equipment. The two 'Centres of Mathematical and Automated Music' which Xenakis directs in Bloomington and Paris do not merely introduce into musical composition 'the universal and general language created by mathematics' but also bring into play computer science, electronic technology, the social sciences *etc* in order to 'determine the constants applicable to the interpretation of the past, the development of the present and the direction of the future'. Closely following the work of such great thinkers as Lévi-Strauss and Leprince-Ringuet, physiologists, psychologists, anthropologists and educationalists are already poring over the results obtained to see to what extent they confirm the nature, history and evolution of the other activities of the human mind. But, with special equipment acquired through the Gulbenkian Foundation and the University of Indiana, the present laboratory researchers are giving priority to the linking of computers with synthesisers capable of converting immediately into sound the results of the mathematical processes. The success of this enterprise will shorten still further the gap between the imagination or selection of the composer and the final aspect of the music.

Despite the use he makes of highly sophisticated technology, Xenakis is not afraid to take up cudgels against 'the present technocrats and their followers who reduce music to a message that the composer (source) transmits to a listener (receptor). In this way', he says, 'they think they can reduce the nature of music and the arts generally to Information Theory formulas'. He also condemns those he calls 'intuitionists'

who, as opposed to the technocrats, believe in the power of improvisation and 'escape into gestures and gimmicks which betray what limited confidence they have in pure music'.

However, it is not in the middle ground between these two extremes that Xenakis makes his music and follows his destiny. 'In music, as in politics, the middle of the road means compromise, hence being compromised', he writes. He is a fervent advocate of clear-sightedness and critical acumen, of action resulting from reflection. He holds that 'in the service of music, as in all human creative activity, scientific and mathematical thought must be joined dialectically with intuition'. For him, 'music is a profound game, the most profound there is', which remains despite dissection, analysis and synthesis 'an impenetrable mystery'.

In this statement lies the justification for the confidence Xenakis places in the performing musician. All his works reveal the high opinion he holds of the anonymous instrumentalist in the orchestra, 'like the stone in a mosaic, the composer being, himself too, a stone in a mosaic'. It is striking to note that his orchestral parts are not difficult to read, and offer only specific problems of co-ordination and precise ensemble. The musicians of the ORTF Orchestra, who have several times rebelled against this music, have never used as an objection that it was difficult to decipher or of an insurmountable virtuosity, but only the fact that in their eyes it was not real music because it demanded from their instruments 'noises' contrary to their idea of beautiful musical sound. It is true, moreover, that the extreme division of the parts, rather than stimulating everyone's sense of responsibility, still today induces in the instrumentalist a feeling of insecurity for which, on occasion, he will reproach the composer.

In the first issue of the periodical *Musique en Jeu* (1970) Xenakis explained himself: 'When, in symphony orchestras, you have a musician . . . who is there with his serial number, bound to his fourteenth desk in the second violins, he inevitably feels like a musical pariah; there is a class struggle whether one likes it or not. I tried to give the artist back his dignity by making him do individual things . . . As they were new forms, he felt lost and had to provide an intellectual effort and a professional and artistic consciousness much greater than before, above all on account of the ideas of mass structure'. Correct interpretation of Xenakis' works thus implies that the orchestra should no longer be a phalanx of functionaries liable to disruption and paralysis at the least foray outside the repertoire.

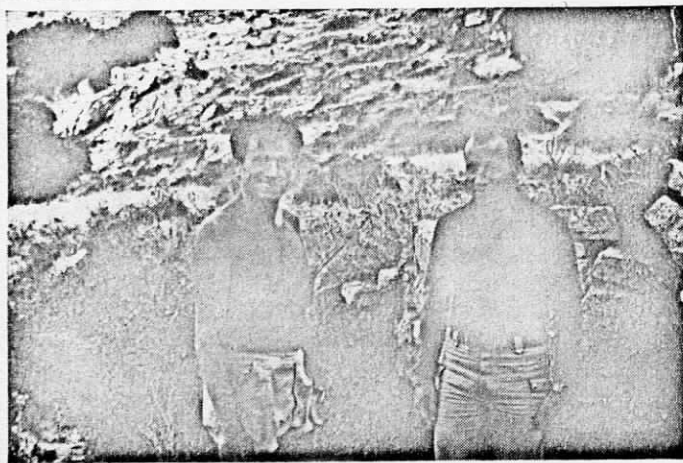
As for the soloist, likewise constrained to 'total presence in the music', he is with Xenakis constantly driven to fantastic acts of valour. Most of the time he must even invent a new technique to play the score entrusted to him. *Herma*, *Eonta* and *Synaphai* (connections) for piano and orchestra — first played at Royan in 1971 with Georges Pludermacher, conducted by Michel Tabachnik — are three important works which, at various levels, surpass the limitations of the piano and subtly dissolve its fixed sonority (of pitch and timbre) in all manner of liquid susurrations, explosions, radiant and sinewy flashes, enriched with incredible acrobatic feats. Notably *Synaphai*, whose solo part is written on ten staves (one for each finger), demonstrates fully how the instrument is treated globally, in its sonic entirety, without concession to the archetypes of digital virtuosity. In *Nomos Alpha* the cellist literally makes war on his instrument, driving it into a last ditch, to the point where some great dramatic energy lightens little by little the strange conflict.

The composer's treatment of voices is no less singular. To start with there is the archaic *recto tono* recitation of *Polla Ta Dhina* (on the *Hymn to Man* from Sophocles' *Antigone*) for children's choir and orchestra, first performed at Stuttgart

in 1962 under the direction of Hermann Scherchen. Then the powerful rough-hewn choral blocks used in the incidental music for *The Suppliant Women*, the *Oresteia* and *Medea*, where the echo of Greek antiquity is recovered indirectly through Byzantine chant and Balkan folk music. Finally *Nuits*, first performed by the Soloists of the ORTF Choirs at the 1968 Royan Festival and very rapidly taken up all over the world, arrives at an original and exceptionally convincing synthesis. From quarter-tone whispers to great raucous screams, by way of the nasal sonorities of Chinese opera, the impressive gravity of Middle-Eastern religious chant, the onomatopœic calls of Janequin, howls, death-rattles, gasps, shushings, breaths *etc.*, there is nothing in *Nuits* that has not been completely renewed, adapted, subdued by an upsurging, sovereign, irresistible mind. It is as if suddenly the human voice, for so long a victim of faking — above all the vibrato, which Xenakis considers the surest way to 'kill the sound' — as if the very essence of the voice were being revealed at last. And not by the artifice of beautiful tone, but simply by sublimation of the cry and the lamentation.

With the twelve mixed voices of *Nuits*, with the string quartet of *ST/4*, with the twelve instrumentalists of the Lucerne Festival Strings, who commissioned *Aroua* (earth) first performed in 1971 under Michel Tabachnik, Xenakis proves his excellence by avoiding the sound clichés associated with quite traditional groupings — and that, moreover, with or without the assistance of the computer. For example, *Anaktoria* (beautiful as a palace), written for the Paris Octet which performed it first at the 1969 Avignon Festival and about 100 times since, does not illustrate any precise theory, and was composed directly without any foregoing calculation. Nevertheless it brought to light an organic instrumental life which seemed unknown until that time. The problem confronting the composer was intractable: to have play together two violins, viola, cello, double-bass, clarinet, bassoon and horn—in effect scarcely, if at all, homogeneous — without separating them too much or fusing them arbitrarily, and in a language at the opposite pole from that customary in the genre. It thus required a music-catalyst capable of reconciling and defining antinomic sound personalities, and making them fulfil each other. This impossible chemistry starts out in the most natural way in the world with a horn call prolonged in reflection (not in echo) by the bassoon in its high register. Trial attacks on the same note, imitating the two instruments, introduce long sustained unisons which are gradually separated by insinuating micro-intervals. Then an animated rustling of strings with the arsenal of glissandi and *col legno* effects normal in Xenakis' use of the bow. All this within a surprising stasis, a hypnotic immobility of pitches. Next comes the

Xenakis with the author in 1970



H-L de La Grange

dialogue of deep tremolos between clarinet and bassoon, tremolos of varying amplitude which expand or contract like concentric circles. Then notes repeated to the point of vertigo, percussive sounds of continually different duration and intensity, the sharp calls of the three wind instruments dominating the sounds from the five bows, the cricket-like chirping of the clarinet right at the top of its register, a very low snore from the mistuned double-bass, gnashings across the tail-piece of the cello, fantastic Larsen effects extracted from the clarinet, and those granulous bass notes held for so long that one ends by distinguishing the vibratory groundswell. In short, by simply observing the possibilities and 'non-possibilities' of the eight instruments Xenakis renews from top to bottom the sonic amalgam of the octet.

Perhaps it is surprising, considering the unlimited resources he discovers and exploits in voices and instruments, that Xenakis in his electro-acoustic works — *concrète*, electronic or both at once, or further modified or mixed — continues to believe in the virtues of magnetic tape. But one should first recall that he followed very closely the experiments of Varèse in this area (*Déserts* 1954, *Le Poème électronique* 1958) and that he passed, like Boulez and Stockhausen among others, through the Paris studios of Pierre Schaeffer. In fact it was with the ORTF Musical Research Group that he realised, between 1957 and 1962, *Diamorphoses*, *Concret PH*, *Orient-Occident*, *Bohor* and the tape of *Analogiques A et B*. He returned there in 1968 to put together the four-track tape of *Kraanerg* (achievement, active energy), a vast fresco 60 minutes long, combining orchestra and loudspeakers which was choreographed by Roland Petit for the inauguration of the Ottawa Arts Centre in June 1969. The most recent piece of this kind in the Xenakis catalogue, the eight-track tape of *Persepolis* for the 1971 Shiraz Festival, was realised at the Acousti private studio in Paris.

In most of these pieces the composer makes no concessions either towards the more or less anecdotal 'sound objects' of concrete music or towards electronic music's uniformity of material. Taking what he wants from both, using the sounds of Nature or the sounds of instruments or of synthesisers, Xenakis weaves great webs, immense musical tapestries of an abundant complexity, which contain 'very shrill sounds, and very deep, and of very great intensity over the whole spectrum'. This unfurling plenteousness is harnessed by the process as if in the power of some irresistible tellurian force. And this is why, from *Diamorphoses* to *Persepolis*, it is always the geological violence of the music that imposes itself rather than the cogs of its formal machinery.

As from *Bohor* in 1962 'stereophony is exploited not for its faculty of allowing cinematic effects to be sensed, but with the more classical aim of enriching the quality of sound; the consequent refinement of perception reveals, by a sort of building up of information, the infinitely varied diversity of the microstructures'. Which brings us finally to the description of one of Xenakis' most remarkable and spectacular conquests: the use and mastery of space in music.

The premiere at the 1966 Royan Festival under Hermann Scherchen (a few weeks before his death) of *Terretektorh* (construction by action) for 88 instrumentalists scattered among the audience represented a definitive step in this area of research and remains a key date in the music of the last ten years. Certain works of Karlheinz Stockhausen (*Gruppen* 1955-7, *Carré* 1958-60) had already successfully experimented with fragmentation of the orchestra into three and four groups around the hall in order to achieve displacement of sound in space. Iannis Xenakis adopted a principle at once more radical and more flexible: the total semi-stochastic dispersal of the musicians among the audience. In his preface the composer emphasises that 'this dispersal involves a radic-

ally new cinematic conception of music, unattainable by any existing electro-acoustic means. For, while one cannot imagine 88 tape decks corresponding to 88 sound-sources distributed in space, one can achieve just that with a classical orchestra. The process of musical composition will then be completely enriched, through and through, with the dimensions of space and movement. The speed and the acceleration of sound displacement will be actualised, new and potent processes — temporal and geometrical—such as logarithmic and Archimedean spirals employed. Controlled or conversely ataxic movements of sound masses rolling one against the other or in waves *etc.*, will be possible. *Terrektorh*, then, is a sonotron: an accelerator of sound particles, a disintegrator of sound masses, a synthesiser. It puts sound and music around man, right beside him. It tears down the psychological and auditory curtain which separates the listener from the musicians habitually set far away on a stage-pedestal . . . [Further] orchestral colour is moved towards a spectrum of dry sounds, replete with noise, with the aim of broadening the sound palette of the orchestra and allowing the dispersal maximum efficacy. To this end each of the musicians has at his disposal, in addition to his usual instrument, three percussion instruments (wood-block, maracas, whip) and a little whistle-siren with three registers which produces sounds similar to flames. Thus a shower of hail can surround each listener, or the murmur of a pine-forest, or any other atmosphere or static or moving linear concept. In fine each individual listener will be perched on the summit of a mountain in the middle of a tempest which assaults him from all sides, or in a frail craft in the midst of an agitated sea, or in a pointillist universe of sonic sparks moving in compact or isolated clouds . . .'

Nomos Gamma for 98 instrumentalists, first performed at the 1969 Royan Festival under Charles Bruck, takes up this system and perfects it, giving it a greater power of abstraction. The 'powerful deterministic machinery' here takes the form of

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a huge sound-turbine and translates into music a 'combination process outside time of groups of sound elements . . . put into pairs, identified, classed and organised with the aid of Group Structure principles'. On the other hand it is to 'Sieve' theory and the 'logical functions of the residual classes of modulo *m*' that *Perséphassa* (archaic name for Persephone) refers. This was first performed the same year at the Shiraz Festival in the ruins of Persepolis by the Percussions de Strasbourg. The six percussionists are placed in a ring around the audience, the better to catch them in their cross-fire. 'The principal merit of this piece,' according to François-Bernard Mâche (*La nouvelle Revue française*, 204), 'is the lofty recklessness with which the composer takes up the task of writing true percussion sound, dense, violent, unadorned. One at once recognises that it is not a matter of judging niceties of writing, formal merits, technical innovations, even though one meets them. A magic ceremony rather than a work, *Perséphassa* is, as Artaud would say, a black rite.'

This family of spatial pieces, all more or less unconnected with temporality, leads logically to a spectacle where the visual elements correspond closely with sound events in one all-embracing treatment of space. Numerous choreographers have investigated along these lines, but without ever having transcended what Xenakis calls the 'peaceful coexistence between music and dance'. It is quite clear that only total automation can guarantee coherence of ensemble such as one saw, notably, in *Hibiki Hana Ma* (sound, resonance; flower, beauty, grace of action; dimension, interval, distance of space and time) commissioned for the Japanese Iron and Steel Federation's pavilion at the 1970 Osaka International Exposition. Conceived for orchestra, drums and biwa (Japanese lute) this 17-minute work was then processed and recorded on twelve tracks so it could move automatically through the acoustic space of the auditorium, following a special cinematic score which took into account the possibilities offered by 800 loudspeakers placed in 250 groups around the spectators. Here the multi-spatial impact of the sound dictates not only an effect of relief, perspective and mobility in three dimensions, but a sort of overlaid polyphony which the Japanese sculptor Keiji Usami made precisely and transparently visible by a whole network, light and rapidly moving, of laser beams projected from the centre and walls of the concert hall, following a programme exactly parallel to that of the music.

More and more the architect-composer Xenakis is himself undertaking the visualisation of his works. For Georges Balanchine, who choreographed *Metastasis* and *Pithoprakta* and who is preparing *Antikhthon*, he designed mobile sets in the form of geometric bushes. On November 29 last, for the performance of *Hibiki Hana Ma* at the Domaine Musical, he played at the silent apparatus of some 50 automatic sections which form the stage of the Paris Théâtre de la Ville. He is currently at work on a vast audio-visual spectacle, completely automated, comprising spatial electro-acoustic music, laser beams and electronic flashlights, for the next Autumn Festival and International Music Week in Paris.

Two major works have already established him in the field, more modern than ever, of synthesising sound with visual art. First *Polytope*, for four orchestras on tape with electronic lamps and flashlights, commissioned to fill the central zone of the 1967 Montreal Expo French pavilion. This is, in a sense, the meeting of two musics, one to be heard, the other to be seen. 'I have used for the lighting here,' Xenakis explained, "all my experience of musical composition: Calculus of Probabilities, Logical Structures, Group Structures . . . There are 1,200 independent circuits (or independent lights) which function through a board of photo-electric cells on which they are all reproduced. On this board a film is projected, letting the projector's ray touch only those places where

a photo-electric cell is to be activated. There are 800 white xenon tubes and 400 coloured ones, half cold, half warm'. The success of this work has taken it on a career far beyond the Expo enclosure.

The most recent and also the most eloquent of Xenakis' grand audio-visual realisations was conceived to open the 1970 Shiraz Festival in the very ruins of Persepolis, whose name it bears. This time, while employing eight-track electro-acoustic music, two laser beams and hundreds of projectors, the composer also utilised elements natural (huge fierce fires alight on the mountainside) and human (a crowd of torch bearers). It is in fact a symbolic spectacle inspired by Zoroastrianism, and intended to incorporate the whole area of the ancient site. Without one single scrap of narrative, the unfolding of the work reaches literally epic dimensions.

Thus, in this field as in that of pure music, there is proof of a speculative mind which, having absorbed scientific knowledge to the highest level, has escaped the vertigo of theory for its own sake in order to verify and affirm truths glimpsed in-

tuitively.

Fortified by a knowledge and transcendence of the near and distant past and by day-to-day experience, Xenakis' actions and reflections are wholly directed towards the future, and are influencing its development. 'After 25 centuries of civilisation', he writes, 'Man has reached a kind of mastery over Nature through reasoning and technology. Today it is possible that society may achieve a transformation of its actual mentality . . . The music of tomorrow, proceeding by previously unknown structures, particular to space and time, could become a tool in this transformation of mankind, by influencing the make-up of the mind'.

In the etymological sense (that of architect), in the metaphysical sense (god as constructor of the universe, after the Platonists) as in the literary sense (of creator), other than Xenakis there has existed no single man in our time more worthy of the title of demiurge.

translated by MO and TS

List of works with discography:

- 1953-4** *Metastasis* for orchestra (conducted by Michel Le Roux, Chant du Monde LDX-A-8368);
- 1955-6** *Pithoprakta* for orchestra (conducted by Michel Le Roux, Chant du Monde LDX-A-8368; conducted Lukas Foss, Nonesuch H-71201);
- 1956-7** *Achorripsis* for 21 instruments (conducted by Konstantin Simonovich, EMI C 06110011);
- 1957** *Diamorphoses*, electronic music (Boîte à Musique LD 5070; second version Erato STU 70530);
- 1958** *Concret PH*, electronic music (Philips 835487 AY; second version Erato STU 70530);
- 1959** *Duel*, game for two orchestras;
Syrmos for 18 string instruments (conducted by Marius Constant, Erato STU 70526);
Analogiques A et B for nine string instruments and tape (Philips 835487 AY);
- 1960** *Orient-Occident*, electronic music (Philips 836.897 SY; third version Erato STU 70530);
- 1960-1** *Herma* for piano (Georges Pludermacher, EMI CVT 2190; Yuji Takahashi, Mainstream 5000);
- 1956-62** *ST/4* for string quartet (Bernède Quartet, EMI CVT 2086);
ST/10 for ten instruments (conducted by Konstantin Simonovich, EMI C 06110011);
Morsima-Amorsima for piano, violin, cello and double-bass (conducted by Konstantin Simonovich, EMI CVT 2086; Paris Octet, Classic 920.217);
Amorsima-Morsima for ten instruments;
- 1958-62** *Atrées* for ten instruments (conducted by Konstantin Simonovich, EMI CVT 2086);
- 1959-62** *ST/48* for 48 instruments;
Stratégie, game for two orchestras (RCA Japan SJV 1513);
- 1962** *Bohor*, electronic music (Erato STU 70530);
Polla Ta Dhina for children's choir and orchestra (conducted by Konstantin Simonovich, EMI C 06110011);
- 1963-4** *Eonta* for piano and five brass instruments (Yuji Takahashi, conducted by Konstantin Simonovich, Chant du Monde LDX-A-8368);
- 1964** *Hiketides*, incidental music for women's choir and ten instruments;
- 1964-5** *Akrata* for 16 wind instruments (conducted by Konstantin Simonovich, EMI C 06110011; con-

- ducted by R Dufallo, CBS 34-61226; conducted by Lukas Foss, Nonesuch H-71201);
- 1965-6** *Terretektorh* for an orchestra distributed among the audience (conducted by Charles Bruck, Erato STU 70529);
Nomos Alpha for unaccompanied cello (Pierre Penassou, EMI CVT 2086);
Oresteia, incidental music for mixed choir, children's choir and chamber orchestra (concert suite conducted by Marius Constant, Erato STU 70565);
- 1967** *Medea*, incidental music for men's chorus, pebbles and orchestra (concert suite conducted by Marius Constant, Erato STU 70526);
Polytope, a spectacle of light and sound, music for four orchestras (conducted by Marius Constant, Erato STU 70526);
- 1967-8** *Nuits* for twelve unaccompanied voices (conducted by Marcel Courland, Erato STU 70457);
Nomos Gamma for an orchestra distributed among the audience (conducted by Charles Bruck, Erato STU 70529);
- 1968-9** *Kraanerg*, ballet music for orchestra and tape (conducted by Marius Constant, Erato STU 70527-8);
- 1969** *Anaktoria* for eight instruments (Paris Octet, Classic 920.217);
Perséphassa for six percussionists (Percussions de Strasbourg, Philips 6521020);
Synaphai for piano and orchestra;
- 1969-70** *Hibiki Hana Ma*, music for an audio-visual spectacle on twelve-track tape (conducted by Seiji Ozawa, RCA Japan JRZ 2501);
- 1971** *Charisma* for clarinet and cello;
Aroua for twelve string instruments;
Persepolis, electronic music for an audio-visual spectacle;
Antikthon, ballet music for orchestra;
- 1972** *Linaia* for horn, trombone and tuba.

Principal publications:

- Eléments de Musique Stochastique* (Gravesaner Blätter, Mainz, Nos 11, 12, 18, 19, 20, 21, 22, 23 and 26);
- Musiques formelles* (*La Revue musicale*, Editions Richard-Masse, Paris, 1963);
- Musique-Architecture* (Editions Casterman, Paris, 1971);
- Formalised Music* (Indiana University Press, Bloomington, 1971).