

# HYPNAGOGIA

The Nature and Function of the Hypnagogic State

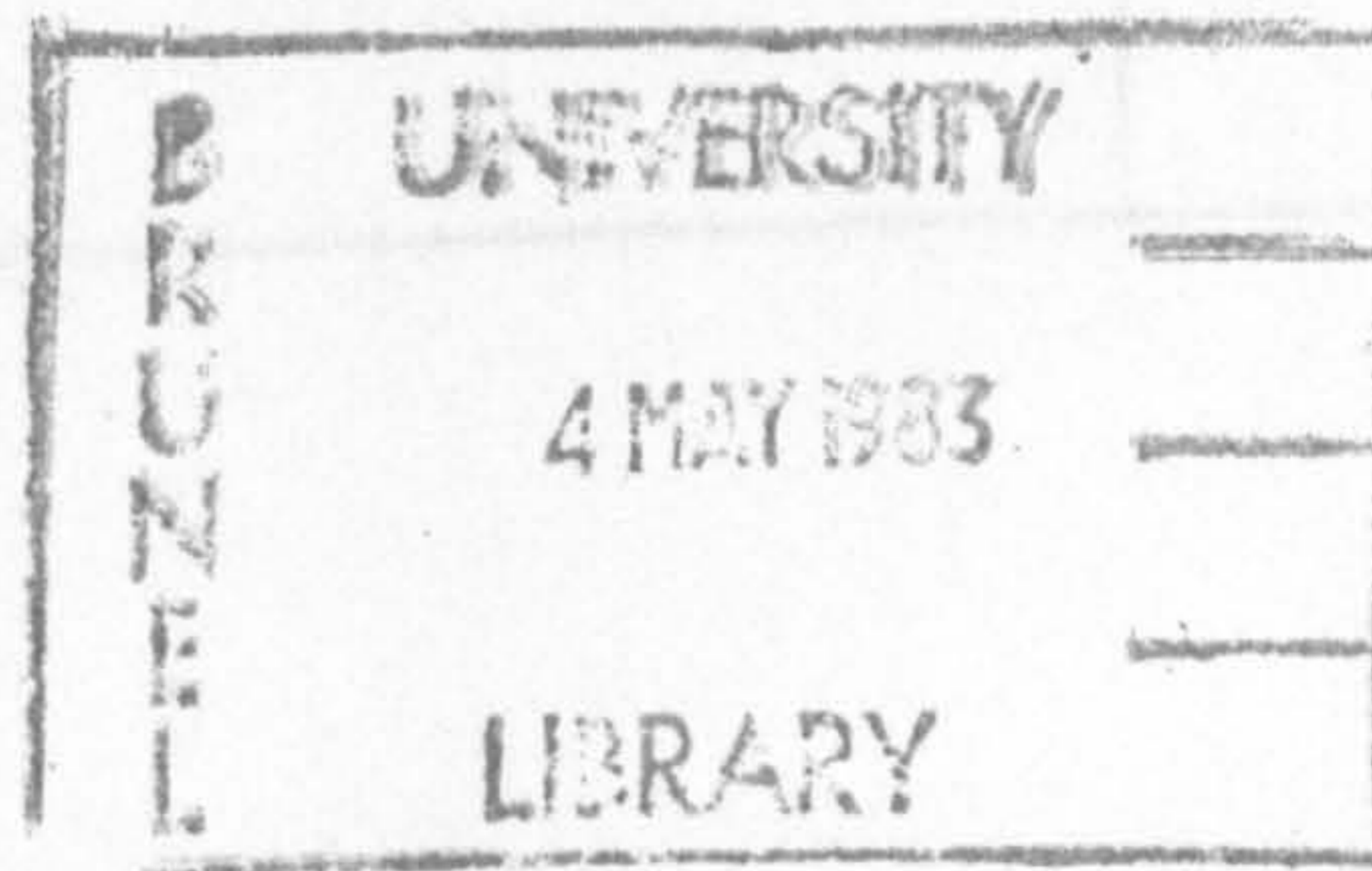
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CHAPTER 13CREATIVITY:

Hypnagogia has been related to the creative process in varying ways by a number of writers. Maury (1857, p. 164) spoke of "the spontaneous generation of ideas in hypnagogia, and Gurney (1885) of "an immense amount of high creative work". Greenwood (1894) remarked that in hypnagogia all the mental faculties are "lifted into a higher range of freedom". Crichton-Browne (1895) speaking of dreamy mental states in general compared them with the "flights of genius". Myers (1903) talked of "a general heightening of faculty" in hypnagogia. Arnold-Forster (1921, p.149) noted that "at such moments the answer to some difficult question... may flash into the mind". Sartre (1978, p.47) referred to hypnagogic mentation as "an entirely new way of thinking". A quotation from Novalis (Bégouin 1939, p.210) reads: "To dream and altogether not to dream. This synthesis is the operation of the genius, by which both activities are mutually reinforced".

Varendonck (1921) reported that he had conceived his most original contributions to science just before falling asleep. Problem solving in hypnagogia has also been reported by Kekulé (Japp 1878), W. Scott (Beveridge 1950, pp. 73-74), Poincaré (1913), Stanford (1977), Edison (Bernd 1978), Hadamard, Einstein, Brindley (Koestler 1981, pp. 116-117, 183, 211). To these must be added the 'informational' cases referred to in the chapter on 'Psi', that is, cases where the subject has a sudden solution to a problem or is 'warned' about an impending danger.

Marsh (1906) found that most artistic and literary creative people were at their best in early morning and late evening, and Green et al (1970) and Green and Green (1978) pointed out that many outstanding creative individuals have reported that their greatest insights were associated with reverie and hypnagogic imagery. Poems (Miller 1906; Prince 1952; Moss 1970; Coleridge: Koestler 1981), stories for novels (Caldwell: Stearn 1973), and whole novels (Leader 1973: cited by Panati 1975) have been

conceived in the hypnagogic-hypnopompic state. M. Twain, E.A. Poe, R.L. Stevenson (Hollingworth 1911), L. Carroll (Panati 1975), Max Ernst (1952), Wagner and Bradbury (McKellar 1957) and C. Lamb and T. de Quincey (McKellar 1979b) are known to have used hypnagogic imagery as source material. Melville (1961) in his 'Moby Dick' describes a tactile hypnagogic experience as occurring to Ishmael, one of the characters in the novel (see Schneck 1977 for discussion). Emily Brontë also describes hypnagogic imagery in 'Wuthering Heights', and Charlotte Brontë in 'Villette' describes what she calls an opium vision which she personally experienced not as a result of taking opium - she denied ever having taken any - but as the outcome of having thought about it on numerous occasions before sleep: "The vision itself", McKellar (1963, p.141), reports, "emerged on one occasion after waking up in the morning".

Brahms (Abell 1964, pp.19-21), Puccini and Wagner (Gowan 1976) described hypnagogiclike trances as states wherein they had created their famous compositions. Keats probably had similar experiences judging by his 'Ode to a Nightingale' which opens with the description of "a drowsy numbness" and closes with the lines:

Was it a vision, or a waking dream?  
Fled is that music: - do I wake or sleep?

The same may also be said of the Spanish poet Bécquer who, in one of his poems, wrote: "I did not sleep but wandered in that limbo where objects change shape, the mysterious tracts that separate waking from sleep" (quoted by Lewin 1969, p.116). Of the modern painters, besides Ernst already referred to, Dali is well known for his use of a method of hypnagogic relaxation as a means of both relaxation and inspiration. His paintings are full of hypnagogic imagery and one of them bears the title: "Dream caused by the flight of a bee around a pomegranate one second before waking up". Similarly, Oster (1966) has produced a number of paintings based on his hypnagogic phosphenes.

Edison is said to have made extensive use of hypnagogia as a means of arriving at new ideas. Bernd (1978)

reports that

Edison used to work very hard in his research - at beta, the faster brain wave frequencies. Then when he would reach a 'sticking point' he would take one of his famous 'cat naps'. He would doze off in his favourite chair, holding steel balls in the palms of his hands. As he would fall asleep - drifting into alpha - his arms would relax and lower, letting the balls fall into pans on the floor. The noise would wake Edison, and very often he would awaken with an idea to continue with his project.

(Bernd 1978, pp.28-29).

Bernd follows the above report with the question: "what might this genius have done if he had known how to use alpha levels consciously without falling asleep to get there?" (p.29). Attempts to answer such a question have involved the relating of creativity to alphoid brain waves and hypnagogia. Elmer Green and his co-workers A. Green and D. Walters have directed their attention specifically to this problem.

Using autogenic feedback techniques, they have set out "to study the general processes, conditions, and contents of consciousness during a state of deep reverie. This combination of reverie and awareness seems to be an essential (though maybe not sufficient) ingredient of creativity" (Green, Green and Walters 1970, p.21). They drew attention to the following considerations:

(a) the existence of a link or relationship between alpha-and-theta-rhythms in the brain wave and reverie-and-hypnagogic-imagery, and to (b) the existence of a link or relationship between reverie-and-hypnagogic-imagery and creativity. It can be inferred from the above juxtaposition that the areas of alpha-and-theta-rhythms and creativity may indeed overlap, and that training in the production and control of alpha-and-theta-rhythms may make possible an enhancement of creativity in individuals whose potential is yet unrealized.

(Green et al 1970, pp.11-12).

Earlier on they speak of "hypnagogic-like imagery" as the "sine qua non of creativity for many outstanding people" (p.10). They define "reverie" as "a state of inward-turned abstract attention or internal scanning" (p.10, note 3) and explain their use of the qualifying term "hypnagogic-like" instead of hypnagogic "because our subjects were

trying to remain awake rather than go to sleep" (p.12, note 6).

In pilot studies with "a professor of physics, a psychiatrist, and a psychologist, all of whom are uniquely individualistic, creative, and successful in their respective vocations" (p.12, note 4), Green and his co-workers reported that their subjects demonstrated "an unusually high percentage of 6-8½ Hertz waves in their EEG records during periods of deep reverie" (p.12). Two of them showed long trains of theta waves in conjunction with hypnagogic-like imagery "which they said was customary in their internal scanning experience" whilst the third managed to lower his alpha rhythm to 8.3 Hertz "during 1-minute trials and reported this as a preliminary mind-quieting imageless stage in moving toward a deeper state of reverie" (p.12).

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In what follows I shall examine the general concept of creativity and point out what are thought to be the necessary and sufficient conditions for creative activity. I shall present cases of inspiration and creativity occurring in the hypnagogic-hypnopompic state and argue that the latter contains some, and sometimes all, of the necessary and sufficient conditions for the emergence of creativity. I shall also relate schizophrenia to creativity and argue that the state of hypnagogia is their natural meeting place, so to speak, and that the study of the latter can throw light on both of the former. I shall maintain that the necessary and sufficient conditions for creativity to be discussed are functions of the loosening of ego boundaries which is a defining feature of hypnagogia.

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The literature on creativity may be roughly divided into the following areas characterized by different research orientations:

(1): Personality traits, abilities, and attitudes identified

in creative individuals (e.g., Meier 1939; Wilson et al 1953; Angyal 1956; Barron 1958, 1963; Lowenfeld 1958; Whiting 1958; Hilgard 1959; Fromm 1959; Rogers 1959; Guilford 1959, 1962; Maslow 1968; Drevdahl and Cattell 1958; Mooney 1956; Mooney and Razik 1967; Abdel-Salan 1963).

(2): Research into the creative process per se. This may be divided into sub-groups again characterized by theoretical orientations suggested by evidential reports. Hallman (1967) has identified three such areas. They are:

(2a): Creativity as a series of chronological stages (e.g. Dewey 1910; Wallas 1926; Rossman 1931; Poincaré 1913; Montmasson 1931; Patrick 1937; Spender 1946; Hutchinson 1939, 1949; Ghiselin 1952; Vinacke 1952; Hadamard 1954; Arnold 1959). This view is exemplified by Wallas's (1926) preparation, incubation, inspiration, evaluation stages.

(2b): Creativity as "an interchange of energy among vertical layers of psychological systems", e.g., "as the primary and secondary processes, the autistic and the reality adjusted, unconscious mechanisms and unconscious deliberation, free and bound energies, gestalt-free and articulating tendencies" (Hallman 1967, p.17). Besides Freud (1959), other proponents of such view include Schneider 1950; Ehrenzweig 1953; Maslow 1959; Murray 1959).

(2c): Creativity as types of thinking which are distinct from non-creative ones. Thus, creative mentation is integrating, synthesizing, relational, fusing of disparate elements. Hallman (1967, p.18) summarizes examples of this view: "Spearman (1931) refers to creative thinking as the education of correlates; Vinacke (1952), as imagination rather than voluntary, rational operations; Bartlett (1958) as divergent autistic thinking as distinguished from closed systems. Bruner's book On Knowing (1962) makes the same distinction".

(3): Training for creativity, e.g., by 'synetics' (e.g., Gordon 1961), 'brain-storming' (e.g., Parnes 1962; Osborn 1963).

(4): Studying creativity through hypnosis (e.g., Krippner 1964; MacKinnon 1964).

(5): Creativity in education (e.g., Mearns 1925; Getzels

and Jackson 1962; MacKinnon 1962; Torrance 1962; Parnes 1963; Cattell 1968).

Hallman (1967) has identified five criteria for creativity: ( $\alpha$ ) connectedness, ( $\beta$ ) nonrationality, ( $\gamma$ ) originality, ( $\delta$ ) openness, ( $\epsilon$ ) self-actualization. These he considers to be the necessary and sufficient conditions of creativity. I shall examine them below and argue that, with certain qualifications in respect to ( $\gamma$ ) and ( $\epsilon$ ) these features are present in hypnagogia.

#### Connectedness and 'actualized' metaphors:

The criterion of connectedness, which, as Hallman points out, employs the category of relation as a principle of explanation and isolates the relation of similitude as its basic feature, has been proposed by a number of workers who described it variously as combinatorial activity (Bruner 1962), fusion (McKellar 1957), unexpected connections resulting from unconscious symbolic activity (Kubie 1958), compositional activity whose outcome is a new object, experience or image (Murray 1959), new configurations (Ghiselin 1952; Arnold 1959).

Hallman (p.19) argues that "connectedness comprises relationships which are neither symmetrical nor transitive; that is, the newly created connections as wholes are not equivalent to the parts being connected. Neither side of the equation validly implies the other, for the relationship is neither inferential nor causal; rather, it is metaphoric and transformational".

The feature of connectedness in creativity is to be found in all areas of human activity: perceptual, intellectual, imaginative.

In respect to hypnagogia it is encountered as the fusion of (i) relatively relevant components to form a composite, as in Galton's (1883) and Katz's (1948) photographs and (ii) apparently disparate elements belonging to entirely different matrices. The mechanisms of this activity may be present in the waking state as "contrary imaginations" or divergent thinking (Hudson 1968) but the quality

of fusions in hypnagogia is considered unique (Leroy 1933; Rapaport 1967a).

In regards to (i) there are the numerous reports of hypnagogic experiences which contain unrecognizable images whose parts are, nonetheless, recognized as belonging to past perceptual or imaginative experiences, as being 'like' something already experienced but with added dimensions; that is, in agreement with Hallman, "the newly created connections as wholes are not equivalent to the parts being connected". A case in point here is that of Miller's (1906).

She relates how one night she experienced and wrote a hypnagogic drama she called "Chiwantopel". Lying in bed with closed eyes, she writes, "[I] had the sensation that I was waiting for something to happen. Then I felt a great relaxation and I remained as impassive as possible" (p.48). There followed the familiar hypnagogic mosaic of "lines, sparks and spirals of light... [and]... a kaleidoscopic and fragmented review of recent trivial events. Then came the impression that something was about to be communicated to me". There appeared the figure of an Inca, complete with head-dress, who bore the name of "Chi-wan-to-pel", which Miller heard spelled out syllable by syllable. Round this character raged a battle and the cries of "wa-ma, wa-ma" were heard. There followed other scenes, and the little drama ended with Chiwantopel's dying monologue which was delivered in English except for the last words which were: "Ja-ni-wa-ma, Ja-ni-wa-ma" and stood for "You will understand" (p.50).

Miller attempts to explain her experiences by reference to previous wakeful ones which she believes probably provided the various elements that eventually came together (fused, combined) in hypnagogia and unfolded as a new, self-contained drama. Although she does not attempt to explain the genesis of the Inca-like neologisms "wa-ma" and "Ja-ni-wa-ma" she suggests that "Chi-wan-to-pel" may have been subconsciously constructed along the lines of "Po-po-cat-a-pel" a central American volcano whose name she was familiar with. Other elements were also condensed



and rearranged unconsciously before emerging in their new form during her hypnagogic experience. But, more important, she explains that during the days before this experience she "had been searching for inspiration, for an original idea" (p.51) and that this "mosaic" was the outcome of distant and recent experiences brought together by this need. Interestingly, Miller's explanations of this and other of her hypnagogic experiences were given out as an argument against possible spiritualistic interpretations of such events. This, and the presence of neologisms, clearly point both to the close relationship that may be seen as existing between psi, schizophrenia, and creativity and to the fact that hypnagogia constitutes the meeting place, or the general frame of mind, wherein such states may naturally make their appearance.

Koestler (1981, p.167) suggests that Coleridge's "Kubla Khan" originated "in an intense day-dream or hypnagogic state... some intermediary kind of 'waking dream'". Coleridge himself noted that

Ideas and images exist in the twilight realms of consciousness, that shadowy half-being, that state of nascent existence in the twilight of imagination and just on the vestibule of consciousness, a confluence of our recollections through which we establish a centre, as it were, a sort of nucleus in [this] reservoir of the soul.

(cited by Gerard 1946, p.481).

Moreover, Coleridge (1952, pp.84-85) also stated that prior to having the Kubla Khan experience "in which all the images rose up before him as things", he had been reading 'Purcha's Pilgrimage' where Khan Kubla's palace and stately garden were described. Thus, to borrow Lowes's words in analysing another of Coleridge's poems, 'The Ancient Mariner', on this hypnagogic occasion "facts which sank at intervals out of conscious recollection drew together beneath the surface through almost chemical affinities of common elements.... Beneath the poem lie... innumerable blendings and fusings of impressions, brought about below the level of conscious mental processes" (cited by Gerard 1946, p. 481).

An experience similar to Miller's and Coleridge's but

occurring at the hypnopompic end is also described by one of Prince's (1952) subjects. She writes:

I woke suddenly some time between three and four in the morning. I was perfectly wide awake and conscious of my surroundings but for a short time - perhaps two or three minutes - I could not move, and I saw this vision which I recognized as such.

(Prince 1952, p.204).

The vision which was "extraordinarily clear" depicted a tender love scene between a man and a woman set against "a sort of rosy atmosphere". The subject notes that she did not experience any emotion at the moment of seeing the vision and that she wrote it down, in verse, at once. In the next morning she read over what she had written and "was amazed at the language and the rhythm". She presented the poem to Prince exactly as it was written. Again, as in Miller's case, the subject notes:

For two or three days previously I had been trying to write some verses, and had been reading a good deal of poetry. I had been thinking in rhythm. I had also been under considerable nervous and emotional strain for some little time in reference to the facts portrayed in the verse.

(Prince 1952, p.206).

Einstein's basic insight into the relativity of Time came to him early one morning as he got out of bed. And, as Koestler (1981, p.183) remarks, that sudden moment of truth had been preceded by ten years of contemplation on the subject. Likewise Hadamard's (1954) long and intense thinking culminated in a hypnopompic illumination. He writes:

One phenomenon is certain and I can vouch for its absolute certainty: the sudden and immediate appearance of a solution at the very moment of sudden awakening. On being very abruptly awakened by an external noise, a solution long searched for appeared to me at once without the slightest instant of reflection on my part - the fact was remarkable enough to have struck me unforgettably - and in quite a different direction from any of those which I had previously tried to follow.

(Hadamard: quoted by Koestler 1981, pp.116-7).

In a similar manner, Lamberton (Newbold 1897, pp.11-13) achieved the solution of a problem that had "bogged" him after two weeks of intense analytic thinking over it.

Having put aside the problem for a week, he woke up one morning with its solution projected in front of him. He wrote:

On opening my eyes on the morning in question, I saw projected upon this blackboard surface a complete figure, containing not only the lines given by the problem, but also a number of auxiliary lines, and just such lines as without further thought solved the problem at once.

(quoted by Newbold 1897, p.12)

Moreover, he noted that "the solution was entirely geometrical, whereas I had been labouring for it analytically without ever drawing or attempting to draw a single figure". Likewise, Cocteau (1952, p.82) saw hypnopompically what he later turned into his play 'The Knights of the Round Table'. "One morning", he writes, "after having slept poorly, I woke with a start and witnessed, as from a seat in a theater, three acts which brought to life an epoch and characters about which I had no documentary information and which I regarded moreover as forbidding". Poincaré describes his discovery of Fuchsian functions as follows:

For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs, interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I had only to write out the results, which took but a few hours.

(Poincaré 1978, p.81).

But perhaps the most celebrated case of creativity in hypnagogia, one that led to a discovery which has been called "the most brilliant piece of prediction to be found in the whole range of organic chemistry" (Koestler 1981, p.118) is that reported to the German Chemical Society in 1890 by Kekulé. He recounts how one evening he dozed on a London bus and saw atoms gambolling before his eyes and spent part of that night making sketches of these forms. Some years later a similar event led to the discovery of

the ring of the benzene molecule. He relates:

I was sitting, writing at my text-book; but the work did not progress; my thoughts were elsewhere. I turned my chair to the fire and dozed. Again the atoms were gambolling before my eyes. This time the smaller groups kept modestly in the background. My mental eyes, rendered more acute by repeated visions of the kind, could now distinguish larger structures, of manifold conformation: long rows, sometimes more closely fitted together; all twining and twisting in snake-like motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke; and this time also I spent the rest of the night working out the consequences of the hypothesis.

(quoted by Japp 1898, p.100).

As McKellar (1963, p.134) rightly points out, "the illumination occurred in his hypnagogic mental life because his mind was stored with the relevant facts from past perceptual experience". However, it is just as important to note that it was under the special conditions prevailing in hypnagogia that a number of perceptual experiences were brought together and became relevant within a particular framework. Moreover, the facts from past experiences emerged in the hypnagogic vision in a symbolic form, that is, the snake-like formations represented molecular structures. Interestingly, in this type of example can be seen in operation a mechanism somewhat opposite to that observed by Silberer in his autosymbolic phenomena. That is, instead of conceptual activity becoming symbolically represented in visual imagery, the emergence of the latter gives rise to a concept, viz., that some organic compounds, e.g., the benzene molecule, are closed chains or rings.

This character of transferring from concept to imagery and vice versa is, in fact, an aspect of a wider feature of hypnagogia that encompasses synaesthetic activity where imagery of one sense modality transforms itself into, or gives rise to, imagery of another sense modality. It is also seen as a transfer from one conceptual frame of reference to another. Indeed, synaesthetic transformations are themselves transferences across FsOR.

This form of activity is often described in papers on creativity as the subject's employment of metaphor.

The creative use of metaphor is that which enhances, or presents in a new light, a certain state of affairs. Aristotle (1969) in his 'Poetics' writing on the use of language stated that "by far the greatest thing is to be a master of metaphor" and that such mastery is "an indication of genius, since the ability to forge a good metaphor shows that the poet has an intuitive perception of the similarity in dissimilars" (1459a), that is, the poet is capable of shifting imagery and concepts across FsOR. He also argued that it is a great thing for a creative poet to use unusual word order, "as well as compounds and strange words, in the proper way".

It might, of course, be argued that the crossing of FsOR, and the employment of unusual word order, compounds and strange words in hypnagogia are not executed "in the proper way", that they occur out of context and they are irrelevant. But, as I have already argued, and shall presently augment that argument, this is not always the case. Moreover, given the appropriate attention to the hypnagogic imagery, it may never be the case.

In hypnagogia, metaphors are actualities. Metaphors used in everyday life and in the arts are called by McKellar (1963, p.144) "synaesthetic descriptions". In hypnagogia, although they may be seen by the waking mind as symbols or representations, they are often experienced as actualities, that is, they are taken on their face value. This is strongly reminiscent of Nietzsche's description of the creative process in which "one loses all perception of what is imagery and simile" (1952, p.203), and Coleridge's Kubla Khan experience "in which all the images rose up before him as things" (1952, pp.84-5). It is only by oscillating in and out of hypnagogia, thus allowing the waking mind some room for judgement, or by learning to remain passive-receptive in hypnagogia that one can appreciate the metaphoric aspect of the imagery of the state. But these metaphor-actualities occurring as they do in hypnagogia render the state unique in acting as the general condition wherein artistic and scientific creativity as well as schizophrenic and primitive-regressive

mentation emerge. Thus, we find Kretschmer (1934) writing on artistic creativity:

Such creative products of the artistic imagination tend to emerge from a psychic twilight, a state of lessened consciousness and diminished attentivity to external stimuli. Further, the condition is one of 'absent-mindedness' with hypnoidal over-concentration on a single focus, providing an entirely passive experience, frequently of a visual character, divorced from the categories of space and time, and reason and will.

(Kretschmer: quoted by Koestler 1981, p.325)

Under the same or very similar conditions of child-like absorption, a schizophrenic patient of his related how, whilst in a transitional state between normality and abnormality, on reading a philosophical work by Kant "the abstract thoughts are continuously converted into imagery" which, divorced from space and time and reason and will, is "arbitrary as in an experimental picture or a dream". Kretschmer further remarks that the language of primitive people is "like the unfolding of a picture strip, where each word expresses a pictorial image, regardless as to whether the picture signifies an object, an action, or a quality". Koestler (1981, p.322) concurs that "pictorial thinking is an earlier and more primitive form of mentation than conceptual thinking - in the evolution of the individual as in that of the species. The language of children is 'picturesque' - again in the literal sense of the word".

And yet it is this 'primitive' and 'regressive' type of mentation that very often creative individuals resort to in order to experience (perceive-conceive) and understand their own ideas. Einstein (1952, p.43), for instance, says that "the psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be 'voluntarily' reproduced and combined". Bartlett (1932, p.226) stated that the "image method remains the method of brilliant discovery", Richardson (1969, p.12) linked vivid imagery in adults with creativity, Paivio (1971, 1974) suggested that the stage of illumination or discovery is characterized by concrete imagery.

McClelland (1964, p.141) remarked that "scientists ... still live to a moderate degree in the world of witches, gnomes, fairies and ogres", and Schaefer (1975) concluded that "anecdotal reports... indicate that there is at least a partially controlled lowering of ego controls so that fantastic and primitive associations arise to the consciousness".

Einstein's statement does not seem to me at all dissimilar either to that by Kretschmer describing primitive thinking as a picture-strip in which pictures signify objects, actions and qualities or to reports by hypnagogists whose experiences may constitute quasi-perceptual representations of abstract concepts, functions, actions, relationships, etc. (see, e.g., Silberer 1965; Slight 1924; van Dusen 1972, 1975). Moreover, Schaefer's comments fit exactly a deliberately induced-sustained hypnagogia.

As already argued, hypnagogia can be prolonged and its imagery, to a certain extent, manipulated if the subject learns to poise himself in a passive-receptive mode and enter into a conversational-empathic relationship with the imagery. In such cases, where the imagery is fascinatedly attended to, there is often also an accompaniment of a sense of significance. It is of interest to compare this with what Wallas (1926) says about the stage of illumination in the creative process (Wallas's stages will be discussed further later in this chapter):

I find it convenient to use the term 'intimation' for that moment in the illumination stage when our fringe consciousness of an association train is in the stage of rising consciousness which indicates that the fully conscious flash of success is coming.... If this feeling of intimation lasts for an appreciable time, and is either sufficiently conscious or can by effort of attention be made sufficiently conscious, it is obvious that our will can be brought directly to bear on it. We can at least attempt to inhibit, or prolong or divert the brain activity which intimation shows to be going on. And, if intimation accompanies a rising train of association which the brain accepts, so to speak, as plausible, but would not without the effort of attention automatically push to the 'flash' of conscious success, we can attempt to hold on to such a train on the chance that it may succeed.

(Wallas 1978, p.97)

Wallas's state of intimation may perhaps become clearer and its relationship to the hypnagogic 'fringe' consciousness more obvious if we bear in mind what has been said above, namely, that both in hypnagogia and in creativity there is present, and in a literal sense, what might be called an activity of imaginal perception, that is, an experience of vivid, life-like imagery. Walkup (1965, p. 36) has noted that "creative individuals appear to have stumbled onto and then developed to a high degree of perfection an unusual ability to visualize mentally - almost hallucinate - in the areas in which they are creative". He uses the word 'visualize' "to include the mental synthesizing of many sensory experiences, not just ocular experiences" (p.37). In analysing the nature of 'seeing' in the field of scientific creativity, he writes:

It is almost a feeling like the object being visualized. One can feel the pressure of contacting objects or the erosion of material by friction, or the flow of heat from one point to another, or the swing of the oscillating electrical circuit, or the bending of light as it passes from one medium to another, or the appropriateness of a well-designed structure to hold a maximum load, with every part equally strained in the process, or the eternal bouncing about of the molecules of gas, or the almost physical transfer of energy from the gasoline, through the motor, transmission, and to the driving wheels of the automobile. It is as though one's kinesthetic sensing mechanisms were associated with the physical object and that he thus sensed directly what was going on in the external system.

(Walkup 1965, p.39).

Similarly, Farady 'saw' electromagnetic lines of force, and Einstein (1952, p.43) referring to the "elements in thought" mentioned above says that in his case these were "of visual and some of muscular type" and that "the play with the mentioned elements is aimed to be analogous to certain logical connections one is searching for". Thus, even logical connections may be experienced as forms of imagery. As Richardson (1969, p.124) also notes, "it is not merely a physical object that can be represented in visual imagery but almost any subtlety of logical relationships". Indeed, in Bugelski's (1970) review it is argued that meanings depend on images. However, it is not my



aim here to argue for the status of imagery in general but (a) to put into relief the paradox that highly intellectual individuals engaged in abstract mental activities resort to 'primitive' imagery to solve their problems, and (b) to further my argument that most, if not all, of the conditions of creativity are present in hypnagogia.

The paradox referred to above might not be thought as being present in hypnagogia since the state is considered in general to be regressive anyway and so the occurrence of vivid imagery in it might not be regarded as contradictory. However, if Wallas's description of the state of "intimation" in creativity means anything this condition is not dissimilar to that obtained in hypnagogia. This implies that at least some essential aspects of creativity are necessarily regressive in character. More significant, hypnagogia as a breeding ground for metaphors, analogies, and vivid imagery is, or must be, conducive to creativity. Moreover, hypnagogia may render more obvious certain important mental processes, such as the use of imagery present in scientific creative activity. More to the point, the vivid hypnagogic concretization of imagery may not necessarily be 'primitive' or 'regressive'.

If in the ordinary waking state we think of a generic or abstract concept we generally (excepting those endowed with a tendency to extreme concretization verging on the pathological, e.g., Luria's 1975 Shereshevski) engage in some form of imaging - visualizing, verbalizing, etc. - in which the relevant concept is vaguely represented. However, if we try to become more clear and precise in our conceptualization we find that the concept begins to acquire spatial qualities and that concurrently, as the concept is shaping up, we engage in internal kinesthetic activities in relation to the concept - as if one is mentally giving birth, sculpturing, or moulding inside oneself in a pliant medium. In ordinary wakefulness abstract concepts may have a typically impressionistic quality about them (e.g., Titchener 1909; Koffka 1912; Binet 1921; Arnheim 1969) but when concentrated on they display unique imaginal qualities which go beyond the sum total of the

particular cases they may represent. They also invariably involve the kinesthetic participation of the subject: they, in a specific sense, become 'subjectified'. (It might be of some interest to note that the Greek words for understanding - καταλαμβάνω, αντιλαμβάνομαι - literally mean to seize, occupy, take possession, make one's own).

We have already seen in earlier chapters that this is in fact the case with hypnagogic imagery, that is, hypnagogic imagery, due partly to the subject's absorption, becomes 'subjectified', linked empathically and kinesthetically to the subject. We have also seen that some images look like objects perceived during the day, or on earlier occasions, and that they are not exact reproductions of actual perceptions but rather "idealized" images of them (e.g., Hanawalt 1954). It might thus be argued that some hypnagogic images are none less than generic concepts and that these, and probably all, concepts, are not only representable in imagery types but also, in the last analysis, they must be experienced as such. This contention is further supported by the fact that even mathematical and philosophical thinking is expressed in some kind of shifting inner tension, i.e., kinesthetically.

In this way hypnagogia may throw light on the mechanism of a normal mental activity and suggest an explanation, and perhaps a resolution, of the apparent paradox of the use of 'primitive' types of imagery (visual-kinesthetic) in intellectual tasks. This is essentially achieved because of the specific state of consciousness the hypnagogist finds himself in, a state which in many respects resembles the one an individual finds himself in when engaged in an act of creation. But, although 'idealization' or the process of arriving at a generic concept is a normal and ordinary process, the indication afforded by hypnagogia of both how it is arrived at and how it looks and feels points to a much wider underlying process of fusion and condensation that stems out of the root phenomenon of the LEB of the subject in both hypnagogia and the creative act.

We have seen in earlier chapters how the LEB showed itself at one level of hypnagogia as drifting, falling, swelling, shrinking, etc., at another level as the

facilitation of over-inclusiveness in conceptualization and the fusing of a number of apparently unrelated FsOR. At yet another and deeper level it was seen as the relaxing of the logical dampers normally applied on the waking everyday reality.

It is significant that similar observations have also been made about the nature of creativity. We saw earlier that creativity consists mainly in the making of combinations of elements that have not been made before. Poincaré (1978, p.80) further says that "Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart". In a similar vein Mednick (1962, p.228) states that "creative individuals must have access to improbable associative responses". Cropley (1978) also argues that

Clearly the more a person treats data which look to have nothing to do with each other as though they are related, the more likely he is to make data combinations which are unusual (i.e., to think creatively). The kind of person who codes in this broad way is referred to as a wide categorizer, while the opposite kind of person is called a narrow categorizer.... willingness to treat data whose connexion with each other is not immediately apparent as roughly equivalent would be particularly favourable to the appearance of creativity. Creative thinking thus looks to be related to width of categorizing.

(Cropley 1978, pp.120-1).

Now, it will be recalled from earlier arguments that the equivalence of apparently unrelated data and concepts is not uncommon in hypnagogia (e.g., Froeschels 1946, 1949; Mintz 1948). Froeschels (1949), for instance, drew attention to the fact that in hypnagogia tenuously related ideas, concepts, functions, situations, etc., become not merely related but identified, that vague similarity turns into sameness. This tendency to relate and equate not only different concepts but also entirely unrelated matrices is a feature both of hypnagogia and of creativity. As Jones (1948) pointed out, "in science the process of discovery and invention consists of freeing the tendency to 'note identity in difference'" (Milner 1981, pp.161-2). The actual state of consciousness in which such relationships and equations are effected is probably very similar

to that in which metaphors and analogies are experienced as actualities in hypnagogia. Indeed, if we consider an analogy in itself as a concept then the experiencing of such a concept as an actual event or thing and not as something analogous to something else becomes the same as experiencing the original idea about which the analogy is made. This is clearly the case in hypnagogia, as pointed out earlier: metaphors and analogies are experienced as actualities. It might be argued that this is not the case in creativity, that in the latter analogies are seen as such and as nothing more. However, this is debatable. Apart from Croyley's and my own argument above there are the introspective reports of individuals which strongly suggest that creative persons often experience analogies and metaphors as things, i.e., as actualities.

Significantly, such imaginal events may move in either of two different directions and bring together FsOR which are not obviously related. Thus, in Silberer's autosymbolic phenomena an abstract concept belonging to its own particular FOR is first transformed into imagery and experienced as such, i.e., as a new thing in a different FOR, and then it is identified with the concept it represents. In Kekulé's example the procedure is reversed: there is first the vision of the snake biting its tail, in itself an imaginal actuality, then comes the transfer to a different matrix, viz., that of chemistry. In an earlier example we saw how Slight (1924), while in a hypnopompic state, thought of a particular woman he knew who represented a certain character type and who then turned into another woman he also knew. While still in the hypnopompic state he then realised that the identification of these two women resulted from the analogy afforded by certain character traits shared by both. But, importantly, he did not immediately see the resemblance; on the contrary, he began by identifying or completely equating the one with the other (see also Schneck 1968 for a similar case). The same is often the case with creativity, as can be seen from Wallas's (1926), Kretschmer's (1934) and Walkup's (1965) quotations above. From these quotations it is clear that sometimes

the metaphors 'seen' by many scientists are not only literally seen and felt but they also turn out to be identical with what they are supposed to be metaphors of. For instance, Faraday's electromagnetic fields composed of lines of force are precisely that, as can be seen in Kirlian photographs (see e.g., Panati 1975). Incidentally, such observations have important epistemological implications as they tend to suggest that a great deal of mental 'seeing' is more of a literal experience than a metaphor taken from visual perception as some writers seem to believe (e.g., Ryle 1976, and the school of philosophical behaviourism).

The imaginably actualized metaphors in creativity form only one side of the balancing act that results in the creative act, the other side being the recognition that the metaphor brings together two or more FsOR. In the case of Kekulé, for instance, the hypnagogic vision of a snake biting its tail would not have acquired the importance attached to it had not Kekulé seen it as an analogy within the framework of organic chemistry. Hypnagogia is full of such metaphors and symbols. It has already been argued in earlier chapters that when the hypnagogist accepts hypnagogia and enters into an empathic relationship with his imagery (a 'conversation', as van Dusen has put it) hypnagogia may then convey to his consciousness ideas, concepts, relationships, etc., in symbolic form which are recognized as such, i.e., as symbols. It is often the case, however, that these symbols are 'actualized' in the subject's mental space, that is, they are taken as real things, without further recognition of their symbolic value. Indeed, most of the hypnagogic imagery is of this nature. But this is not to say that hypnagogic images may not be seen as symbols, metaphors, etc., should the subject adopt the appropriate stance towards them. In such case the subject may become able to discern the fusion of a number of FsOR. This may result in conscious witticism, genuine poetry, or creative insights. Freud, for one, believed that the essence of poetry was the condensation of several meanings or allusions into a word or phrase (cited by Koestler 1981, p.339). Koestler further points out that in German to "write poetry" is to "condense" (dichten). As said above,

in hypnagogia condensations may not always be recognized as such and, if the subject is considerably absorbed, the imagery is taken on its face value. We saw that this was also the case with the condensation of concepts (e.g., Mintz's, 1948, example) and that this process often resulted in schizophrenic identification of things, functions, concepts, people, etc. (see chapter 12). Thus we have an intimation of hypnagogia as a state in which madness and creativity may come together, a point that will be developed later in this chapter.

Koestler (1981), along with many other writers on creativity, proposes that the creative act is the connecting of previously unconnected matrices of experience. He calls this "the bisociative act", i.e., the associating of two different FsOR, and adds that in the act itself the subject sees both matrices at the same time. In respect to the latter point, hypnagogic creativity is again exemplified by the Kekulé case. It is not unlikely that hypnagogic imagery is replete with unrecognized solutions to problems. The recognition of these solutions is partly dependent on the degree of problem saturation a person subjects himself to and his readiness to appreciate symbols and metaphors encountered in hypnagogia. A main difficulty in appreciating the hypnagogic 'language' in this respect is the fact that it is often expressed in oblique or condensed forms of metaphor and not in overt and explicit analogies. Moreover, hypnagogia operates most often multi-sociatively, that is, it brings together (and condenses) a number of FsOR. These associations and condensations, as suggested in chapter 11, are effected sub- or unconsciously via mediate types of association thus resulting in imagery which is considered simply strange or irrelevant.

Multi-sociation is clearly uncharacteristic of the logic experienced and employed in the normal waking state. It is typical of dream mentation, creativity, psi, schizophrenia, and mysticism all of which are related to hypnagogia. The normal logic of classifying, i.e., bringing together and relating things or concepts according to

strong and/or permanent common properties, and Koestler's bi-sociation, may be considered as forms of, or even subsumed under, the wider and 'older' activity of multi-sociating. It is of some significance that the language which gave to the western world the word logic also contains the word φρήν (freen) = 'mind' (logical mind) whose derivative φρένον (frehnon) means 'brake' or 'damper' thus suggesting that to be logical is to put the dampers on, to control and restrict oneself. On the other hand, the adjective φρενήρης (frehneeris) means frantic, crazy, one whose mind is 'raised' or 'lifted' or whose logical dampers are raised. Moreover, to be logical implies the application of certain rules of logic which are flouted by hypnagogia, and, as we shall presently see, also by the process of creativity. Thus, it also implies a narrowing and converging type of mentation reflecting a deeper and far-reaching condition of tightening of ego boundaries, of sharply outlining an 'outer', objective world clearly defined and differentiated from one's ego schema, i.e., what constitutes one's sense of self as a separate and individual entity. By contrast, the LEB occurring in hypnagogia raises the dampers and facilitates multi-sociation, the latter taking place along normally weakly associated, or entirely foreign to each other, FsOR. The LEB confers the ability to internalize and subjectify diverse matrices and thus identify them with each other: it is widening and diverging as opposed to narrowing and converging. In this sense, it is also regressive, primitive and paralogical.

I shall give an example which demonstrates clearly the difference between waking logic and hypnagogic logic and shows how in the latter many matrices may be brought together. The example is taken from Koestler who used it to demonstrate an entirely different point of argument but it is also suitable for my present point. Koestler recounts how within a certain period of time he had occasion to think of Galton a number of times and in different connections. First he thought of him on one of his birthdays because Galton had lived to the ripe old age of eighty-nine; this thought also recalled the name

'Methuselah'. On another occasion he thought of him on reading about a woman who had killed her malformed baby - because Galton had invented the word 'eugenics'; this also brought up the thought of Hitler and his S.S. men who practised eugenics. On yet another occasion he thought of Galton in association with 'colour-blindness' - first studied by Dalton which rhymes with Galton. And so forth. Now, all these associations are quite normal given the different contexts within which they occurred. The difference with hypnagogia is that in the latter all of these associations may occur simultaneously in a condensed form appearing perhaps as one visual image or a series of fast changing images. For instance, we may have the strange image of the figure of an old man with the face of a beautiful baby wearing Hitler's moustache and squinting in front of the painting of a lovely sunset painted by a famous mad scientist called 'Hilton'! Indeed, as we shall soon see, this type of associating and condensing has been explored to great artistic effect by surrealist painters.

#### The unconscious-nonrational:

The criterion of nonrationality which, according to Hallman (1967, p.22) "logically ... depends upon a category of causality as a principle of explanation" argues that "certain unconscious mental processes are responsible for the metaphoric function of fusing images into new creations". It

... describes the metaphoric, symbolizing processes which produce new connections. I refer to it as non-rational because the combinatorial activity occurs in the form of unconscious operations; it does not belong to the rational mind, nor is it consciously controlled. Rationality divides and distinguishes; it focuses upon differences. Metaphoric activity unites and relates; it flourishes upon similarities, and transpires among the primary processes. Non-rationality is not merely a condition of novelty; it is a cause. The relationship between such processes as condensation, symbolization, displacement, and neologisms and the production of new connections is a causal one. It is the very nature of unconscious (or preconscious) levels of the mind to function metaphorically. The mechanisms which constitute the



unconscious operations make this inevitable. Unless they function, no new connections can occur. Thus, there is an invariant relationship between the two.

(Hallman 1967, pp.22-23).

Hallman further proposes that metaphors lift inferential limitations from language and uncouple causal connections from objects thus allowing for the emergence of new visions and unexpected experiences and views of the world. He identifies three conceptual schemes devised by various writers to explain the creative process all three of which agree on one major fact: "that segment or level of the creative process which is invariably associated with the creation of novelty is nonrational. It lies below the surface of consciousness; it resists rational analysis; it dissolves under logical examination" (p.23). The first framework considers creativity as a series of chronological stages, the second as vertical levels of psychological functions and the third as types of mental processes. I shall discuss all three frameworks below.

In respect to the first framework, Wallas (1926) proposed four stages in the creative process: preparation, incubation, illumination, verification. Others who proposed the same series include Patrick (1937); Poincaré (1913); Hadamard (1954); Arnold (1959); Montmasson (1931); Spender (1946); Vinacke (1952). Beveridge (1950) suggests a similar series.

In regards to the occurrence of creativity in hypnagogia Cade and Coxhead noted that

hypnagogic reverie often presents to consciousness long-forgotten material, vividly displayed in arrangements which the conscious mind might not have thought of, even were all the material available in the form of written notes or sketches. The paradox is that one is most likely to get really creative solutions to problems in mental states where the usual thinking ability is virtually extinguished.

(Cade and Coxhead 1979, p.127).

More specifically, in relating hypnagogia to creativity, and in particular to the four-stage theory, the second and third stages are of the greatest relevance. Indeed, hypnagogic experiences are characterized by the very features describing these two stages. Hallman (1967)

for instance, notes that

The second and third stages actually produce the new connections, the novel relationships, and these transpire in the form of nonrational operations. The incubation stage, for example, consists of spontaneous, uncontrollable events which cluster themselves seemingly in accordance with their own autonomous laws. It involves the relaxation of conscious thinking operations and the inhibition of logical control.

(Hallman 1967, pp.23-24).

He refers to Maslow's (1958) voluntary regression, Ehrenzweig's (1953) surrender of the ego, and Rogers' (1959) openness to experience in this respect.

Hutchinson (1939, p.324), reporting on the creative insight experienced by an Oxford mathematician, quotes:

I knew somehow or other that something had solved itself at the back of my mind, but had no idea of the solution until my pencil almost automatically wrote it out.

(Hutchinson 1939, p.324).

Another case, a research engineer, writes:

In a flash I visualized a drawing of the proper design of the apparatus, immediately I drew out a notebook and, without consciousness of my surroundings, wrote down the answer. I knew it was right.

(Hutchinson 1939, p.325).

Hutchinson (1939) referring to the stage of illumination as the "period or moment of insight" concludes:

Insight... is often accompanied by a flood of ideas, alternative hypotheses appearing at the same time, many of which are difficult to make explicit owing to the crowded rapidity of their appearance.

(Hutchinson 1939, p.329).

He further draws attention to "the almost hallucinatory vividness of the ideas appearing in connection with any sense department - visual, auditory, kinaesthetic" (p.329) in this experience.

The spontaneity, vividness, autonomy, rapidity of change and multitude of imagery and ideation with their multi-aspected paralogical associations, the dissociated or semi-dissociated state, the diminution or dissolution of self-consciousness and logical mentation, openness and regression, these are all features of the state of

hypnagogia. These features, as I have argued, are aspects or ramifications of the LEB. That this is also the case with creativity is here supported by Hallman's (1967, p. 16) remark that "during the experience [i.e., the creative act] all boundary lines fade, distinctions blur, and the artist experiences himself as one with his materials and his vision". The same observation, as we saw earlier, is made of mathematical and scientific creativity.

It might, of course, be argued that hypnagogic 'illumination' or the feeling of inspiration and certainty experienced in hypnagogia, is no guarantee for the validity of the experience. Poincaré, for instance, noted that often this feeling deceives us without being any less vivid, and we only find out when we seek to put on foot the demonstration. I have especially noticed this fact in regard to ideas coming to me in the morning or evening in bed while in a semi-hypnagogic state.

(Poincaré 1978, pp.83-4).

It has been noted at various points in this paper that this, indeed, is the case in hypnagogia. It is, in fact, the pervading feature of hallucination to feel certain that such and such is the case in the absence of external, objective or logical verification. But not all false inspiration and illumination is to be found in hypnagogia. The biographies of creative individuals abound with such cases. Koestler (1981, pp.213-4) names Kepler, Darwin, Huxley, Planck and Einstein. The latter lost two years of hard work owing to a false inspiration; Huxley said that "the tragedies of science are the slayings of beautiful hypotheses by ugly facts" (Koestler 1981, p.214). Koestler (1981, p.212) also refers to an inquiry by the American chemists Platt and Barker which showed that "among those scientists who answered their questionnaire eighty-three per cent claimed frequent or occasional assistance from unconscious intuitions. But at the same time only seven per cent among them asserted that their intuitions were always correct". But if hypnagogia is to be blamed and credited for false and true intuitions, and if the state an individual enters in his incubation and

illumination stages is that of hypnagogia (hypnagogia being thus conducive to creativity) or a hypnagogic-like state, then the above observations strengthen the relationship between creativity and hypnagogia.

Further support for this comes from some of Wallas's remarks. Wallas proposes that

The incubation stage covers two different things, of which the first is the negative fact that during incubation we do not voluntarily or consciously think on a particular problem, and the second is the positive fact that a series of unconscious and involuntary (or preconscious and forevoluntary) mental events may take place during this period.

(Wallas 1978, p.94).

The first aspect of the stage of incubation contains the important element of mental relaxation pointed out by practically all workers in the hypnagogic area as a necessary condition for its induction. Indeed, some investigators (e.g., Collard 1953; Myers 1957) as we have seen, have argued that psychophysical relaxation is sufficient for the emergence of hypnagogic imagery. The same is also claimed by Wallas in respect to the two aspects of the second stage, and the third stage of creativity. To this effect he cites cases of creative thinkers who hit on their most original ideas during periods of their lives when they were forced to relax (and often stay in bed) due to sudden illness. It will be recalled that the same was proposed in regards to hypnagogia, namely, that very often people are struck by the richness of their hypnagogic imagery when they are in ill-health and bedbound. In general, however, hypnagogia contains naturally this element of relaxation as a prerequisite to its induction. Whether the ensuing mental state and the imagery are experienced and remembered or not by the subject is mostly a matter of the degree of wakefulness retained, that is, the natural or acquired disposition of the subject to relax, withdraw, and not fall asleep too quickly. Again, the same is proposed by Wallas regarding the second aspect of incubation (unconscious and involuntary or foreconscious and forevoluntary mental events), and illumination. He says that if the psychological process involved in these stages

is to enter the subject's consciousness and be controlled

... it is necessary that that process should not only last for an appreciable time, but should also be, during that time, sufficiently conscious for the thinker to be at least aware that something is happening to him. On this point, the evidence seems to show that both the unsuccessful trains of association, which might have led to the 'flash' of success, and the final and successful train are normally either unconscious, or take place (with 'risings' and 'fallings' of consciousness as success seems to approach or retire), in that periphery or 'fringe' of consciousness which surrounds our 'focal' consciousness as the sun's 'corona' surrounds the disk in full luminosity. This 'fringe consciousness' may last up to the 'flash' instant, may accompany it, and in some cases may continue beyond it. But, just as it is very difficult to see the sun's corona unless the disk is hidden by a total eclipse, so it is very difficult to observe our 'fringe consciousness' at the instant of full illumination, or to remember the preceding 'fringe' after full illumination has taken place. As William James says: 'when the conclusion is there, we have always forgotten most of the steps preceding its attainment'.

(Wallas 1978, pp.96-97).

There are a number of relevant points in this quotation. If we begin with the last one, the quotation from James could easily have been describing the statement-conclusions encountered in hypnagogia. These, as we saw, may appear as statements, 'heard' or spoken by the subject, carrying with them a feeling of concluding, that is, a feeling that a certain associative or logical activity has taken place below the threshold of consciousness and that the statement constitutes the conclusion of such activity. This is often suggested by the presence of a sense of significance regarding the statement. They are forms of condensation; they may also be called 'collapsed logic' in both senses of the word 'collapse', that is, both in the sense of falling together, condensing, and in the sense of falling down, disintegrating. This view may shed some extra light on the problem of false inspiration by pointing to the two-fold activity of 'breaking up' and 'bringing together' below the threshold of consciousness (either unconsciously or pre-consciously) various objects, concepts, etc.. But, as so many writers have pointed out, the state of creativity relinquishes temporarily the

normally prevailing conscious and logical controls. "It is by virtue of its freedom from restraint", as Koestler (1981, p.189) put it, "that the 'dreamy' way of thinking can benefit the creative person". In hypnagogia where the relinquishing of restraints takes place naturally, there often first occurs a disintegration of objects, concepts, etc., into their constituent parts followed by a new integration. However, as in chemistry, these two steps need not necessarily be consequent on each other but may take place concurrently, in which case aspects or constituents of one may merge with constituents of another (or others) to form a new object, concept, etc. But in the absence of restraint the merging need not follow logical steps. Thus there may appear logical jumps, 'irrelevant' associations, conclusions without (obvious) premises, i.e., intuitions. Koestler (1981) says that

intuitions give the appearance of miraculous flashes, or short-circuits of reasoning. In fact they may be likened to an immersed chain, of which only the beginning and the end are visible above the surface of consciousness.

(Koestler 1981, p.211).

This is in agreement with similar arguments I advanced in earlier chapters. However, it is not always the case that the beginning and the end of the chain are visible. In hypnagogia, more often than not, there is merely a posited statement, usually in auditory or visual form, without an obvious or traceable beginning, and only a sense of significance to indicate some under-the-surface activity. Such statements often look like solutions without problems, like a smile without a Cheshire cat. Should they be true intuitions they may present us with the difficulty of finding the intermediate logical steps. They are reminiscent of Gauss's statement: "I have had my solutions for a long time, but I do not yet know how I am to arrive at them" (cited by Koestler 1981, p.117).

Wallas's description of the fringe consciousness and the stage of illumination in the creative process fits hypnagogia like a glove. We may easily recognize in the "fallings" and "risings" of consciousness the

'oscillations' of hypnagogia. The latter, due to its abolition of restraints rising from the LEB, provides the general milieu conducive to the occurrence of the "flash": it precedes the "flash", accompanies it, and may last beyond it, although sometimes the excitement produced by the "flash" tends to terminate the state (e.g., Kekulé's case). It is also very difficult to recall the succession of images (visual, auditory, etc.) and thoughts, and often even more difficult to observe and analyse objectively the mental activities during this state because of the subject's absorption-fascination which both 'collapses' the gap between him and the phenomenon experienced and dissolves self-consciousness. Again, we are back to the LEB which facilitates internalization and whose nature is clearly non-focal. In this respect I may quote Einstein who, in his letter to Hadamard, wrote:

It seems to me that what you call full consciousness is a limit case which can never be fully accomplished. This seems to me connected with the fact called narrowness of consciousness (Enge des Bewusstseins).

(Einstein 1952, p.43).

Koestler (1981) further comments that

the existence of an intermediary region between the 'limit case' of sharp, narrow focal awareness and the vast unconscious regions of the mind has been recognized for a long time. Fichte (and later Freud) called it the pre-conscious (das Vorbewusstsein), James called it the fringe; Polanyi 'subsidiary awareness'; the analogy with vision yielded 'peripheral awareness'; but since awareness is a matter of degrees, it would be mistaken to draw a sharp line between pre- and unconscious processes, between the shallows and the deep. What matters is the distinction between the single event (the percept, or concept, or word or muscle-action) which for a fleeting moment occupies the focus of attention - and the processes on the periphery which define the context, the purpose and meaning of the former.

(Koestler 1981, p.159).

Nevertheless, in relating the creative process to hypnagogia in the present paper it is important to draw attention to the existence and characteristics of such an in-between state. As we have seen so far, the hypnagogic "fringe consciousness" may furnish us with clues as to the workings of the creative process and may form the

background against which creative intuitions might emerge. Not only does hypnagogia provide the necessary conditions for the eruption or "secretion" (Housman's term referring to the making of poetry) of intuitions, but, being preconscious in nature, it also makes it possible for a subject to become aware of the epistemological changes occurring in himself during the emergence of creative insights. I say 'epistemological changes' because the creative process in itself clearly contains forms of mentation foreign to the logic of wakefulness and which forms of mentation may lead to, or contain new knowledge. Moreover, we saw in the chapter on 'Psi' that some writers have suggested the use of hypnagogia as a means of entering, without losing consciousness (and without contradiction), the realms of the unconscious. Also, Pinard (1957, p.152), referring to the nature of "spontaneous images" spoke of them as apparently "creative not only of themselves but of a non-sensory world which has its own structural and developmental laws". But if such laws exist, their knowledge, or the individual's functioning within them, clearly requires subjective internal changes, that is, changes in the mode of experiencing and knowing. Such changes are facilitated by the LEB occurring in hypnagogia. Thus, hypnagogia 'forces' psychophysical relaxation onto the individual at the same time conferring on him a paralogical mode of cognizing - conditions necessary in the occurrence of creativity. Moreover, it will be presently proposed that, although it is well argued by many workers that the creative linkages are effected in the unconscious, hypnagogia may not only act as a conducive state and/or half-way house for creativity, but also in some cases it may re-present to consciousness activities that have already transpired in the unconscious.

This brings me to the second and third groups of theories subsumed under this heading. The first group, discussed above, comprised arguments supporting the view that creativity, or the creative process, consists of chronological stages, viz., preparation, incubation, illumination, verification. In discussing this framework we saw that the stages of incubation and illumination which constitute the climax of the creative



act, are clearly hypnagogic in their phenomenology, and that hypnagogia is conducive to the emergence of insights.

The second group of theories explains creativity as a relationship of vertical levels of psychological functions. In the main, these theories argue for the interplay and collaboration between unconscious and conscious processes. As Hallman (1967) explains, they assert that though the actual creative process involves a shift in psychic levels, the shift must always occur in such a manner that the metaphoric fusion of elements shall transpire in the unconscious levels and be projected upwards into consciousness.

(Hallman 1967, p.24).

Then, at the rational level, enter elaboration, testing, gestalts, socially derived approvals.

The third group views creativity as a type of thinking distinct from non-creative types. It is distinguished from the latter by the fact that it is combinatorial and that this combinatorial activity is not bound by rationality. Hallman, again, summarizes this view thus:

In every case it is the nonrational, the autistic, the metaphoric, the internally oriented, the spontaneous and involuntary, the integrating, unbound energies which are active in producing new connections. .... These nonrational processes account for the seeming effortlessness and the spontaneity of creative activity; they explain the autonomy, the quality of 'otherness', of being visited by a daemon or a voice. They account for connectedness. And they account for the direction which creative movement assumes.

(Hallman 1967, pp.24-25).

As these two groups of theories seem to me very similar, I shall discuss them together. In doing this I shall also argue, along with Hallman, that unconscious mentation is nonrational. I shall defend this argument on two grounds: (a) on the evidence in respect to the creative process, that is, evidence arguing for unconscious-nonrational activities, and (b) on the definition of the unconscious as given by Drever (1964), namely,

the inner mental dynamic, involving processes which are of a different order from conscious processes, and as such are incapable of becoming conscious processes, though influencing and modifying these in all sorts of ways.

(Drever 1964, p.306).

Naturally, if unconscious mentation is nonrational, and since all experience must pass, in one form or another through consciousness if it is to be retained and talked about, unconscious, nonrational mental events either remain unconscious or become 'rationalized', i.e., render themselves conscious and undergo classification. Thus I disagree with part of Drever's definition, namely, that unconscious processes are incapable of becoming conscious. Indeed, Drever's definition of the preconscious as "material, which, though at the moment is unconscious, is available, and ready to become conscious" (p.219) vitiates that particular part of his definition of the unconscious, and supports my view. I consider this point of great importance because of the preconscious nature of hypnagogia which, as remarked earlier, constituting as it does a state in-between the unconscious and the conscious, makes it possible for material which might never reach consciousness directly to do so. Moreover, it provides examples which demonstrate clearly the nonrationality of unconscious mentation - nonrationality being seen not only as nonreality-oriented mentation but also as noninhibitory, noncontrolled, and non-obviously-purposive.

Let me substantiate these claims by referring to the case of Prince's (1952) subject mentioned earlier in this chapter. It will be recalled that this subject had a hypnopompic vision of a tender love scene which she recorded immediately in the form of a poem. In discussing the case Prince noted that:

The script was written automatically.... The 'thoughts' of the verse were in her 'subconscious mind' [Prince explains in a footnote that "by this is meant 'thoughts' of which she was not aware"]. These 'thoughts' (also described as 'words') were not logically arranged or as written in the verse, but 'sort of tumbled together - mixed up a little'. 'They were not like the thoughts one thinks in composing a verse'. There did not seem to be any attempt at selection from the thoughts or words. No evidence could be elicited to show that the composing was done here.... In other words all happened as if there was a deeper underlying process which did the composing and from this process certain thoughts without logical order emerged to form a subconscious stream and after the composing was done the words of the verse emerged as coconscious

images as they were to be written. This underlying process then 'automatically' did the writing and the composing.

(Prince 1952, p.207).

In her report the subject recorded that although the thoughts expressed in the poem were the thoughts she experienced at the time of seeing the vision, "the language was entirely different from anything I had thought and the writing expressed the emotion which I had not consciously experienced in seeing the vision" (pp.205-6).

The important sequel to the case is that Prince, having hypnotized his subject, discovered that the hypnopompic vision was in fact an accurate re-presentation of a dream experienced immediately prior to waking up. Moreover, he noted that the vision "expresses the mental attitude, sentiments and emotions experienced in the dream but not at the time of the vision" and that "the script gives of the vision an interpretation which was not consciously in mind at the moment of writing" (p.206).

Now, if we assume that unrecalled dreams constitute unconscious mental events then we are here presented with a case in which the subject re-experiences hypnopompically such events and transfers them to conscious memory. This is not to argue that dreams are not recalled in other circumstances, but that in the hypnagogic-hypnopompic state these are re-experienced. Moreover, when such events are re-experienced in apparently different circumstances it is found that the actual mental state of the subject is hypnagogic-like (dreamy, twilight, etc.). It is important to note, however, that although this subject did not re-experience the dream in all its details - the mental attitude, sentiments and emotions were not present - these were given accurately in the poem which, moreover, was composed and written "automatically", i.e., in a state of dissociation. In the dream the subject was a participant, in the hypnagogic vision she was a spectator, in the poem the dream's added dimension, another FOR, was revealed; but had she not been hypnotized this added dimension might not have been uncovered. This suggests, once more, that many hypnagogic-hypnopompic phenomena that appear puzzling

- strange, irrelevant, illogical, crazy - may do so because of hidden FsOR, and that they may be thought of as original or creative when this frame or frames of reference are suddenly made known. Moreover, the state of dissociation may provide "the quality of 'otherness', of being visited by a daemon or a voice" that Hallman noted in respect to creativity. Furthermore, the nonrational character of the unconscious is shown here quite clearly in the fact that the "thoughts" and "words" which were in the subject's "subconscious mind" "were not logically arranged... but 'sort of tumbled together'".

Thus, although unconscious mentation may slip through into waking consciousness in one form or another, hypnagogia constitutes a special and ideal state for 'catching' such mentation in its own process. Also, as we have seen in the present and earlier examples, (e.g., Mintz 1948; Froeschels 1946, 1949), much of this mentation appears to be governed by rules which are nonrational and nonlogical. It might be argued against this that true intuitions and creative insights can be seen in the last analysis to be related logically and rationally to a recognizable and objective state of affairs. But this is, as it were, justification after the event. What is of interest here is how the event takes place, what are the mental processes leading up to and during the event. And these, we find, are nonrational and unconscious, or preconscious, as demonstrated in hypnagogia.

That the preconscious character of hypnagogia renders it ideal for the emergence of nonrational and otherwise unconscious mental processes culminating in creative insights is further supported by the claims of various writers to the effect that creativity requires precisely such a character in order to manifest itself. For instance, Gowan (1975) argues that

Its essence involves openness to preconscious elements.... Creativity involves the 'gentling of the preconscious', since it allows the conscious mind to gain insights from, and to establish an intuitive relationship with the preconscious.... Higher emergent aspects of creativity also appear in individuals such as the 'witness phenomenon', in which the individual witnesses an almost autonomous development of ideas in his own mind, often several at a time.

(Gowan 1975, p.313).

Gowan also argues that "creative production results from leaks (as if by osmosis through a permeable membrane) between the preconscious and the conscious" (p.278) and that Silberer's autosymbolic phenomena "correspond closely to what has often been described as the work of intuitive insight or creative insight" (p.124). Heard (Weil et al 1971, p.9) remarked that "to have truly original thought the mind must throw off its critical guard, its filtering censor. It must put itself in a state of depersonalization". Similarly, Barron (1963, p.249) concludes: "it seems quite evident that at the very heart of the creative process is this ability to shatter the rule of law and regularity of the mind". Koestler (1981, p.146) points out that one of the main themes reverberating through the intimate writings of many creative scientists is "the belittling of logic and deductive reasoning (except for verification after the act)". And he adds: "A branch of knowledge which operates predominantly with abstract symbols, whose entire rationale and credo are objectivity, verifiability, logicality, turns out to be dependent on mental processes which are subjective, irrational, and verifiable only after the event" (p.147). Of artistic creativity he says: "the creative activity of the artist involves momentary regressions to earlier stages in mental evolution, bringing forms of mentation into play which otherwise manifest themselves only in the dream and dream-like state" (p.169). Nietzsche, writing on the composition of "Thus Spake Zarathustra", spoke of "a feeling of being completely beside yourself, ... One hears - one does not seek; one takes - one does not ask who gives; a thought suddenly flashes up like lightning, it comes with necessity, without faltering - I never had any choice in the matter" (Jung 1957, pp.104-5). Jung, commenting on Nietzsche's experience of the creative process, remarked that "the remotest and most hidden associations" were called up in him, and that in such a state "consciousness only plays the role of slave to the daemon of the unconscious" which "inundates it with alien ideas" (p.105).

Returning to scientific creativity, Koestler (1981,

p.169) again draws attention to the temporary relinquishing of conscious controls and the simultaneous bringing into activity of other types of ideation on more primitive levels of mental organization; he further argues that "verbal thinking, and conscious thinking in general, plays only a subordinate part in the decisive phase of the creative act" (p.208), and that during the period of incubation there is simultaneous activity on several planes involving unconscious processes at various levels of depth (p.209).

Summarizing the characteristic features of the prevailing mental activities in the creative process, Koestler says:

The creative act, in so far as it depends on unconscious resources, presupposes a relaxing of the controls and a regression to modes of ideation which are indifferent to the rules of verbal logic, unperturbed by contradiction, untouched by the dogmas and taboos of so-called common sense. At the decisive stage of discovery the codes of disciplined reasoning are suspended - as they are in the dream, the reverie, the manic flight of thought when the stream of ideation is free to drift by its own emotional gravity, as it were, in an apparently 'lawless' fashion.

(Koestler 1981, p.178).

In respect to the law of contradiction in particular he points out that "the unconscious mind of the child and the primitive are indifferent to it" (p.303). As Lévy-Bruhl (1926) also pointed out, "In the collective representations of primitive mentality, objects, beings, events can be, though in a way incomprehensible to us, both themselves and something other than themselves" (quoted by Koestler 1981, p.308).

Similar arguments have been advanced throughout this paper in regard to the nature of hypnagogia. That is, it has been argued that in hypnagogia there takes place a LEB whereby the psychophysical schema we call individuality (i.e. undivided self) undergoes fundamental alterations which reflect throughout the organism, e.g., as body schema changes, synaesthesias, loosening or widening of conceptualization, regression to earlier, empathic modes of functioning characterized by ease of identification and

paralogical thinking, mystical experiences. In this respect I consider it of importance to note another of Koestler's (1981, pp.187-8) remarks, namely that "the fluid boundaries of the self as represented in the unconscious mind, confer on it the gift of empathy - Einfuehlung - of entering into a kind of mental symbiosis with other selves".

By its preconscious nature hypnagogia partakes both of the total unconscious and the fully conscious, oscillating from one to the other, translating from one code into another. The acquisition of a certain control over this process may place a person in a very favourable situation for achieving the creative act. For, as Bowers and Bowers (Fromm and Shor 1972, p.283) observed, creativity involves regression to "passively experienced fantasy and then progression to integration of fantasy with reality". And, to quote Koestler (1981, p.317) once more: "The capacity to regress, more or less at will, to the games of the underground, without losing contact with the surface, seems to be the essence of the poetic, and of any other form of creativity".

It is, of course, not totally true, as seen from the evidence adduced, that regression in the creative act always takes place "without losing contact with the surface". For instance, much creative activity may transpire during sleep (of which activity there is no memory) and the creative insight may flash up in the subject's consciousness at the moment of awakening, as evidenced by the data on "informational" cases furnished in the chapter on "Psi". Some individuals have even learned to communicate to their unconscious their desires for solutions to certain problems which solutions are arrived at or 'given' in a state of hypnagogia. Garrett, for instance, says: "I give my consciousness the task of finding the answer while I sleep, and in the morning at the threshold of awakening, I find the information I sought". Similarly, Walter Scott wrote to a friend saying: "It was always when I first opened my eyes that the desired ideas thronged upon me" (Beveridge 1950, p.74). Interestingly, in great many cases of this kind we find the subject thinking about the problem as he falls asleep, thus transferring his desire for a solution to his

unconscious via the hypnagogic fringe consciousness and receiving an answer at the preconscious hypnopompic end. At the beginning of this chapter reference was also made to Edison's (Bernd 1978) use of hypnagogia to arrive at new inventions.

Although it is not argued here that nonconscious-nonrational mental processes are to account for the whole of the creative act, it is maintained that the nonrational element is paramount in this area. Even where conscious, wakeful thinking is involved (excepting the time of verification), nonrational, regressive tendencies are apparent. This can be seen, for instance, in those theories that argue either for the divergent nature of creativity or for a more balanced divergent-convergent interchange (e.g., Guilford 1950; McKellar 1963). McKellar (1963, p.129) proposes that "what we are likely to assess as 'originality' depends upon the interplay of processes of different kinds rather than upon one single, specific kind of thinking". However, as McKellar himself seems to have suggested in an earlier publication (McKellar 1957), the autistic, regressive, non-rational and non-reality-oriented kind of mentation is at least one half, so to speak, of the creative act. In fact, the literature shows that in most instances it contributes far more than its rational counterpart.

Apart from the clear hypnagogic cases where we find the elements of effortlessness, spontaneity, autonomy, and "otherness", which, as Hallman remarked, are accounted for by the nonrational processes, (e.g., Miller 1906; Prince 1952), some interesting hypnagogic-like instances may be included here which, too, are characterized by the above elements. One such case is that of E. Blyton (McKellar 1957; Stoney 1974). In her correspondence with McKellar Blyton wrote of her "night stories" which appeared vividly and autonomously as she lay in bed "and went on evolving like a proper story till I fell asleep" (Stoney 1974, p. 211). Although she explicitly distinguishes these stories from hypnagogic imagery which is "just a jumble, fleeting, and of no account" it is difficult to see what else they were given the fact that they went on evolving until she



fell asleep. She uses the simile of a "private cinema screen" to describe them. "But", she explains, "it's a 3-dimensional screen, complete with sound, smell and taste - and feeling! This is why I can describe things so realistically in my stories 'as if I had been there'. I have been there - but only in my imagination!" (Stoney 1974, p.210). Her process of writing a story consists of telling herself in a very general way what the story is to be about, and "when, on Monday, I sit down to begin the book, it will already be complete in my imagination" (p.211).

At the actual writing

I shut my eyes for a few minutes, with my portable typewriter on my knees - and I make my mind a blank and wait - and then, as clearly as I would see real children, my characters stand before me in my mind's eye.... I am in the happy position of being able to write a story and read it for the first time, at one and the same moment.... If I am writing 'real' poetry, as distinct from ordinary verse, I have to work hard over it - and welcome the sudden gift of a complete line or two, or the happy word - these come from the 'under-mind' or whatever you call it - the hard thinking comes from my upper conscious mind. I use my 'undermind' a tremendous lot. I send things down to it and let them simmer there, forgotten. The answer comes up complete when I want it.

(Stoney 1974, pp.206-207).

Interestingly, in answering why she prefers a typewriter to a tape-recorder, she says that the latter would "break the spell" - suggesting the presence of fascination. Garrett (1941 pp.64-65) offers a similar case in which the person concerned explicitly points out that

There is no selection, no apparent logical sequence. It is like reading from a written page of an unknown author, and the style is not mine. I listen with fascination as the little tale unfolds itself, and sometimes I say to myself, 'This fellow is surely building his effect in an odd way', and I watch him with something of the excitement which comes when one first encounters a strange and original talent.

(Garrett 1941, p.65).

Similarly, the scene of the death of Uncle Tom in "Uncle Tom's Cabin" (Stowe 1909) came to Stowe while she was sitting "in her pew in the college church at Brunswick, during the communion service.... Suddenly like the unrolling of a picture scroll, the scene of the death of Uncle

Tom seemed to pass before her" (W.F. Prince, 1963, p.174). Commenting on this Prince says that the writing of this chapter "has many analogies in authorship without conscious participation" and that "it seems as though, in the main, the material gushed up from a concealed spring" (p.174).

Suggestive of 'forced' states of fringe consciousness, and at the same time diminishing the gap between hypnagogia proper and hypnagogic-like states, is Beveridge's (1950, p.73) description of some very well known cases of creativity. He writes:

Einstein has reported that his profound generalization connecting space and time occurred to him while he was sick in bed. Descartes is said to have made his discoveries while lying in bed in the morning and both Cannon and Poincaré report having got bright ideas when lying in bed unable to sleep - the only good thing to be said for insomnia! It is said that James Brindley, the great engineer, when up against a difficult problem, would go to bed for several days till it was solved.

(Beveridge 1950, p.73).

To these cases we may add Housman (in Ghiselin 1952, p.91) who stated that "I have seldom written poetry unless I was rather out of health".

In this respect, it will be recalled that in an earlier discussion of hypnagogia it was suggested that for some people hypnagogic phenomena are rarely experienced or attended to unless they were 'forced' to relax and become more receptive and introspective while bedbound.

#### Originality: creativity and madness:

The criterion of originality, Hallman (1967, p.20) points out, logically "requires the category of singularity as a principle of explanation, though the psychologist may prefer the term 'individuality'". Hallman sees this category as specifying four qualities which must be present if a product is to be considered original. These qualities are "novelty, unpredictability, uniqueness, and surprise; they refer to the same fundamental characteristic of originality, but from the frames of reference of philosophy, science, art, and psychology respectively" (p.21).

Novelty is expressed in the finding of new connections (Kubie 1958), relationships (Rogers 1959, 1961), compositions (Murray 1959), insights (Gerard 1961), organizations of experience (Taylor 1959), constellations of meanings (Ghiselin 1952). McKellar (1957) sees creativity as the fusion of perceptual experiences in novel ways, Wilson et al (1953) as remoteness of association, unusual response, and cleverness (Hallman 1967, p.21).

Unpredictability "asserts the incompatibility of creativity and causality theory.... Creativity produces qualities which never existed before and which could never have been predicted on the basis of prior configurations of events. Metaphoric activity intrudes upon logical-causal necessity" (Hallman 1967, p.21).

Likewise, uniqueness asserts that "original creations are incomparable, for there is no class of objects to which they can be compared. They are untranslatable, unexampled" (Hallman 1967, p.22).

Surprise "refers to the psychological effect of novel combinations upon the beholder. Surprise serves as the final test of originality, for without the shock of recognition which registers the novel experience, there would be no occasion for individuals to be moved to appreciate or to produce creative works" (Hallman 1967, p.22). Hallman's list of workers who stressed this quality in creativity includes Fromm (1959), Schachtel (1959), Getzels and Jackson (1962), and Bruner (1962). Getzels and Jackson (1962) draw attention to the presence of surprise in humour, incongruities, and unexpected endings to plots. Bruner (1962) considers it to be the essence of creativity.

The criterion of originality, so essential to the concept of creativity, has, in fact, been reported by many hypnagogic subjects as can be seen in Part One and, indeed, throughout this paper. The quality of novelty has been partly discussed in reference to "connectedness" where we saw how different perceptual and conceptual FsOR fuse or combine in hypnagogia resulting in strange imagery and statement-conclusions. We have also seen that hypnagogia abounds in neologisms, incongruous combinations of words

or ideas, strange combinations of visual imagery e.g., a crab holding a cigar in its claw (McKellar 1963, p.142), visual images viewed from unusual angles (Leaning 1925), juxtapositions of imagery or ideas belonging to different matrices. Wilson et al's (1953) "remoteness of association" and Mednick's (1962) "improbable associative responses" are fully realized in hypnagogia.

Similarly, unpredictability is a regular feature of hypnagogia. Many subjects have spoken not only of the irrelevancy of hypnagogic images to concurrent trains of thought (e.g., Maury 1878; Alexander 1909; Arnold-Forster 1921; Leroy 1933; McKellar 1959; Singer 1976) but also of their irrelevancy to each other and their often unpredictable and apparently disconnected sequences that led to their being compared to a mixed-up collection of lantern slides belonging to a number of different lectures (e.g., McKellar 1977). Again, remoteness, and improbability of association are words well fitting the description of many hypnagogic experiences of imagery.

Referring back to Part One, again we come across reports in which hypnagogic imagery is described as something never experienced before, as unique, as unparalleled in beauty or ugliness and incomparable to any perceptual experience. This has led some subjects to place it in a supernatural or spiritual world (e.g., Leaning 1925; Poe 1949). Also, the unpredictable juxtaposition or fusion of unrelated matrices of imagery or thought, which are typical of hypnagogia, have contributed to the production of unique, if peculiar, quasi-perceptual phenomena and just as unique, if peculiar ideas. We shall see more of this below.

The quality of surprise as the subject's reaction to the novelty, unpredictability, and uniqueness of his imagery and thought is sometimes encountered in hypnagogia. We have seen it, for instance, in Kekulé's case, and in many of those cases where the subject's emotional reaction terminated the state. However, in many cases, the subject's LEB resulting in empathic identification with the contents of his experience deprives him of the ability to recognize the novelty, unpredictability, and uniqueness

of these contents and thus renders him incapable of feeling surprised. Milder words have been used to describe his emotional reaction: curiosity, childlike interest, amusement, or even mild surprise. On the other hand, many reports refer to the subject as a disinterested spectator. Flatness of affect in hypnagogia has been noted by various subjects and investigators, and it has been pointed out that strong emotional reactions have the effect of terminating the state.

Surprise in general, like all emotions, implies a value judgement, it is a personal reaction to the evaluation of a certain state of affairs. This observation bears directly on the concept of originality in creativity and argues for its personal and subjective nature. It suggests that novelty, unpredictability, and uniqueness are relative qualities dependent partly on the individual's history, constitution and character make-up and partly on his general mental state at the moment; they are also dependent on the individual's set of beliefs and social milieu.

Poincaré (1978) argues that "to create consists of making new combinations of associative elements which are useful". Similarly, Mednick (1962, p.221) defines the creative process as "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful". On the other hand, Guilford (1967, p.109) dismisses the criterion of usefulness on the ground that it "involves us in values in a way that science cannot deal with directly; hence the criterion of social usefulness can be quickly dismissed by the psychologist". He defines originality as "the production of unusual, far-fetched, remote, or clever responses" (p.108).

Although Guilford's definition springs from his viewing of originality in an experimental laboratory setting, it can be generalized to apply to any situation if thinking, imaging, conceptualizing, and so on, are seen as responses to overt or covert stimuli. This is not to suggest the adoption of a purely stimulus-response theory of mental life. Stimuli need not be solely externally generated, as in a laboratory setting. Indeed the subject need not

even be conscious of them, as has been seen in the previous section. They may be instigated or sought for by explicit or implicit motivational factors. Thus, we come across creative products in hypnagogia which may be thought of as responses to earlier, and sometimes forgotten, stimuli and which are re-activated, as it were, by current formulated or unformulated motivational factors (e.g., Miller 1906). This analysis may account for the phenomena of serendipity, i.e., the discovery of things for which one is not looking and which impinge on one's consciousness when his conscious mind is otherwise occupied. This is a phenomenon encountered both in creativity and hypnagogia.

In this respect, hypnagogia is teeming with unusual, far-fetched, remote and clever responses. As noted on a number of occasions, this is the result of the crossing, fusion or juxtaposition of two or more FsOR rising from the root phenomenon of the LEB. In a similar vein, Koestler (1981, p.201) remarked that "the essence of discovery is that unlikely marriage of cabbages and kings - of previously unrelated frames of reference or universes of discourse - whose union will solve the previously insoluble problem". Although solutions to posed problems are not infrequent in hypnagogia, the latter is, of course, better known for its unsolicited responses which, consisting as they are of very peculiar marriages, convey a certain air of poetry. This is most apparent in visual and auditory hypnagogic imagery and speech and has led to comparisons with surrealist products. For instance, one of McKellar's (1963, p.142) subjects reported that his hypnagogic imagery was "chiefly noticeable for its original and surrealist character... objects arranged in unusual ways, being most like paintings by Dali".

Indeed, the comparison with surrealism is most fitting. As Brèton (1924) wrote in his manifesto, "surrealism is sheer psychological automatism, by means of which it is intended to express verbally, in writing, or in any other way, the actual function of thought. Thought's dictation in the absence of all control exercised by reason and outside all aesthetic or moral prejudice". Furthermore,

Surrealism is based on belief in the importance of certain forms of association hitherto neglected, in the omnipotence of dream, in the purposeless game of thinking. It aims at the final annihilation of all other psychological mechanisms, and at taking their place in solving the foremost problems of life.

(Brèton: quoted by Schmeller 1960, p.11).

Automatism, which, as Brèton explains is a monologue uttered as rapidly as possible, thus eliminating control and criticism, is reminiscent of Jung's (1909) and Stransky's (Oswald 1962) experiments of the same nature which invited parallels with schizophrenic thinking and states of inattention, and which I have related to hypnagogia in the chapter of 'Schizophrenia'.

In surrealist artistic creations, as in hypnagogic imagery and mentation, "well-known objects are used in a fantastic manner, they are freely linked in a way unheard-of in our conscious, wakeful, purposeful, reality" (Schmeller 1960, p.10). As de Chirico noted: "Furniture taken from its habitual place acquires a particular, strong expressiveness - for instance, when seen in the street, during a removal.... Imagine an armchair, a divan, chairs placed in a group in some deserted spot of Greece, or in the American Prairie" (Schmeller 1960, p.12). As Schmeller (p.12) points out, the surrealist ideal is well represented by "Comte de Lautréamont's" formula: "Beauty: the possibility of a sewing machine and an umbrella meeting on the dissecting table". He further describes the nature of surrealism thus:

Surrealism is contradiction become corporeal and incarnate. On the surrealist stage the law of gravity is suspended, which normally keeps things in their terrestrial order; things penetrate each other and give birth to new beings no longer 'after their kind, whose seed is in themselves upon the earth'. The basic foundations of this cosmos are sunk into an ever-changing ground.

(Schmeller 1960, p.14).

Max Ernst's "oneiric" collages are strongly reminiscent of hypnagogic imagery. This, of course, should not be surprising since Ernst himself reported painting from his own hypnagogic imagery, of "being present as a

spectator, indifferent or impassioned" (Ernst 1952, p.65) at the birth of his own work. Indeed, he explains that he owes his discovery of frottage to "one of those dreams between sleeping and waking" (p.64).

Another painter whose works and method can be most closely related to hypnagogia is Salvador Dali. Not only are the objects in his paintings, as in works of other surrealists, sharply and minutely detailed, but also the development of some of his themes as well as the method he used to conceive of his images are relevant to our discussion. His method he called "paranoiac-critical activity". In his 'Conquest of the Irrational' he describes it thus:

It was in 1929 that Salvador Dali brought his attention to bear upon the internal mechanism of paranoiac phenomena and envisaged the possibility of an experimental method based on the sudden power of the systematic associations proper to paranoia; this method afterwards became the delirio-critical synthesis which bears the name of 'paranoiac-critical activity'. Paranoia: delirium of interpretive association bearing a systematic structure. Paranoiac-critical activity: spontaneous method of irrational knowledge based upon the interpretive-critical association of delirious phenomena.... By this method paranoiac-critical activity discovers new and objective 'significance' in the irrational; it makes the world of delirium pass tangibly on to the plane of reality.

(Dali 1976, pp.436-7).

In this method, by deliberately suspending the wakeful, critical activities of the mind Dali would allow the emergence of unconscious and irrational elements and then seize upon them and utilize them. This is not unlike my description of hypnagoiga as a preconscious state in which material from the unconscious comes to the surface. We saw that this material appears in forms that flout the laws of logic. For instance, they cross or fuse together unrelated FsOR, assimilate unrelated objects or mental processes, allow objects to have added meanings and significances unwarranted by waking logic, allow objects to be themselves and yet something else. Dali's paintings contain all of these paralogical manifestations. One of the most striking effects in his employment of the paranoiac-critical method is the creation of the double or "paranoiac" image which



he describes as "the image of an object which, without the least figurative or anatomical modification can at the same time represent another, absolutely different object (Dali: quoted by Wilson 1980, p.18).

The two best known paintings in which this effect appears are the "Swans reflecting elephants" and the "Metamorphosis of Narcissus". The former, as the title suggests, depicts four swans in a lake whose reflections are strikingly represented by four elephants. The latter carries a much greater significance not only because of its profound theme but also because a book by Dali of the same title provides us with a clue as to its origin and a glimpse of the workings of Dali's paranoiac-critical method:

The clue is in the form of a few lines of dialogue between two fishermen of Port-Lligat, a small fishing village near Cadaquès and Dali's home since 1930. They are evidently speaking of a slightly demented villager:

First fisherman: What's the matter with that chap staring at himself in a mirror all day?

Second fisherman: If you really want to know he's got a bulb in his head.

Dali explains "A bulb in the head" in Catalan corresponds exactly with the psychoanalytic notion of "complex". If a man had a bulb in his head it might break into flower at any moment, Narcissus! Dali's instant association of the mirror with the Greek myth followed by the mental jump of his transformation of the Catalan phrase into the image of the flower sprouting from Narcissus' head, vividly evoke the dynamic processes of paranoiac thought. But the most extraordinary transformation of all is that of the boy's body into the strange fossil hand holding an egg. Here can be seen precisely the way in which paranoiac thought transforms reality to conform with unconscious obsessions. Furthermore, by a masterly stroke of illusionism, a virtuoso piece of painting, Dali makes the change take place before our eyes as our attention switches from the figure in the pool, brilliantly caught at precisely the half-way point from boy to hand, to the final monument at the pool side.

(Wilson 1980, p.18).

Comparable to Dali's 'Metamorphosis of Narcissus' is one of Leroy's (1933, pp.42-3) reports in which the hypnagogic vision of a carpet being shaken from a window brought to the subject's mind the thought of a tooth which led to the carpet's turning into a molar tooth whose roots

represented (turned into) the legs of the person who was shaking the carpet!

The paranoid systematization of associations referred to by Dali has an important bearing on the present discussion in that, as with hypnagogia, it tends to bring together and relate many normally unrelated objects, concepts, processes, and so on. In a sense, the paranoid patient who systematically relates normally unrelated events, thoughts, situations, etc., to his delusion resembles the creative individual who produces unusual, remote, and far-fetched or clever associations and responses: they both associate systematically and the associations they produce are far-fetched and yet relate to a central theme. The resemblance is often too strong to be ignored. It generalizes into one's behaviour. As Guilford (1967, p.107) remarked, "the highly creative person's behaviour is sometimes eccentric. This has sometimes branded him as being abnormal and even pathological". Dali encapsulated the problem in his classical retort: "The only difference between me and a madman is that I am not mad" (Wilson 1980, p.11). The resemblance, however, sinks deeper than Dali's witticism. In some cases it is not merely a superficial resemblance but more of an employment of identical mental processes. These latter, as already seen, are clearly revealed in hypnagogia which thus brings together onto a common ground the genius and the madman.

The marrying of cabbages to kings, the ability or tendency to produce remote, far-fetched associations which is found in both creativity and madness may be seen in hypnagogia as the outcome of the LEB. The presence of the latter in schizophrenia has already been suggested in the previous chapter. The same is being argued in respect to creativity. As Koestler (1981) points out,

From Kepler and Descartes to Planck and de Broglie, the working methods of the great pioneers seem to have been inspired by Einstein's jingle, improvised for the benefit of an unknown lady who asked him for a dedication on a photograph:

A thought that sometimes makes me hazy:  
Am I - or are the others crazy?

(Koestler 1981, p.146).

In reference to Kekulé's hypnagogic vision Koestler (1981, p.170) further remarks that "the whirling, giddy vision reminds me of the hallucinations of schizophrenics, as painted or described by them"; Faraday's visions resemble "the stable delusional systems of paranoia" (p.171).

As I have argued, one of the effects of the LEB is the melting or throwing away of constraints. This effect, Koestler (1981, p.210) argues, "is symptomatic both of the genius and the crank; what distinguishes them is the intuitive guidance which only the former enjoys". But does he always enjoy this guidance, and is the latter any guarantee for drawing an objective distinction? As Koestler himself points out, science is not immune to false inspirations: "a kind of inspired blunder which presents itself in the guise of an original synthesis, and carries the same subjective conviction of Archimedes' cry did" (Koestler 1981, p.212). Moreover, false inspirations may not be mere momentary flights or excited imagination: they may be full-fledged systematized delusions, and as such resist any evidence contradicting their tenets. By and large, Koestler (1981, p.214) continues:

scientists are inclined to trust their intuitions; and if confronted with experiments which give ambiguous or divergent results, either declare - as Einstein did - that 'the facts are wrong'; or - as Hobbes did - that 'the instance is so particular and singular that 'tis scarce worth our observing'; or to resort to the standard phrase that the unfavourable experimental result is due 'to unknown sources of error...'

(Koestler 1981, p.214).

"In other words", he concludes after the discussion of a number of cases, "a physicist should not allow his subjective conviction that he is on the right track to be shaken by contrary experimental data" (pp.245-6). Moreover, lack of recognition that their ideas were right has driven eminent scientists literally insane (Koestler 1981, pp.239-40), indicating the strength and tenacity with which they held onto these ideas. The point is not that they were right or wrong but that they felt certain that they were right. And this feeling of certainty, as shown above, is not restricted to the experiences of those scientific

geniuses that were clinically diagnosed as insane.

The feeling of certainty experienced so indiscriminately in hypnagogia (viz., as accompanying both truth and falsehood), and the tendency to produce unusual relationships and associations, - phenomena which are pre-eminently present in creative individuals and madmen - both, indicate the importance of hypnagogia in uncovering common functional features in creativity and madness and point to the presence of LEB as the possible cause of these phenomena. The feeling of certainty which was proposed in an earlier chapter ("Hypnosis") as taking the diffuse form of a sense that 'nothing can go wrong' during hypnagogia - and thus allowing the individual to surrender his precious waking logic before entering sleep - will be further discussed in the following section in respect to "openness".

The production of unusual and unique associations viewed as partaking of the criterion of originality in creativity, but also found in madness and in hypnagogia, can, further, be seen as the creation of 'actualized' metaphors or analogies in all three conditions. This can be seen in examining and comparing the following four cases: (a) von Domarus's (1964) patient who identified with each other a saint, a box of cigars, and sex on the basis of their all being encircled, (b) Kepler's comparison of the sun, the stars or planets, and the space between them to God the Father, the Son, and the Holy Ghost, (c) Kekulé's vision of the snakes as an analogy with the benzene molecule, and (d) Silberer's autosymbolic hypnagogic phenomena.

To begin with, in all four cases the associations are indeed unusual. It might be argued that in the case of von Domarus's patient the identification is not only unusual but entirely unjustified, indeed crazy. However, the madness is not so much in the remoteness of the associations as in the fact that a metaphor has been taken literally, it has been 'actualized', in the mind of the patient a cigar box is a saint. In Kepler's case I suspect a similar process. On one occasion he specifically stressed that "it is by no means permissible to treat this analogy as an empty comparison; it should be considered by its Platonic

form and archetypal quality as one of the primary causes" (quoted by Koestler 1981, pp.125-126). The interesting point here is that the image of the holy trinity as an analogy was superimposed on the solar system much in the way a paranoid relates phenomena to fit his central belief. Kepler's comparison of the planets to the Son is not merely unusual but entirely irrelevant: there is neither external similarity (the Son is one, the planets are many) nor an internal one (the Son does not revolve round the Father). Kekulé's and Silberer's examples have already been discussed.

Poetry, like all other forms of art, makes perhaps an easier comparison with hypnagogic mentation and speech than scientific invention. It also makes an easier comparison with madness. In science one may apply the criterion of usefulness no matter how relative the latter might be; he can also apply sheer logic and rational analysis to scientific products. But with poetry such criteria may not be merely inadequate but altogether inappropriate. Koestler (1981, p.352) thought of art as the juxtaposition of FsOR. Housman (1952, p.86) spoke of poetry as essentially devoid of meaning. The latter regards Blake as "the most poetical of all poets" and "more poetical than Shakespeare" primarily because "Blake's meaning is often unimportant or virtually non-existent, so that we can listen with all our hearing to his celestial tune" (1952, p. 87). He also says that "the production of poetry, in its first stage, is less an active than a passive and involuntary process" (ib., p.91) and quotes Plato who said:

He who without the Muses' madness in his soul comes knocking at the door of poetry and thinks that art will make him anything fit to be called a poet, finds that the poetry which he indites in his sober senses is beaten hollow by the poetry of madmen.

(Plato: quoted by Housman 1952, p.86).

In this transient state of madness the creative poet brings together images from distant FsOR and produces unusual associations and, as Aristotle noted, compounds and strange words. As already pointed out by many writers, the more remote these elements the more fertile or creative

the process. Mednick (1962, p.221), for instance, quotes as an illustration a line from Marianne Moore's (1951) "The Monkey Puzzle" which reads: "The lion's ferocious chrysanthemum head". Compare this with Hannah Green's (1973): "Heat-craze my teeth in bitterest anger" and "there was a gear all teeth, two at least world-caught. And now nothing engages the world!" Or the hypnagogic sentence reported by one of Trömmner's (1911) subjects: "He regally escaped into his existence". Many other hypnagogic examples have been given in Chapter 12 and throughout this paper.

Housman's statement in respect to the first stage of poetic creation being passive and involuntary and his reference to Plato's view of poetic inspiration, introduce into the present discussion certain terms which are often used in relation to creativity and sometimes as its synonyms, namely, 'intuition', 'insight', 'inspiration'. I consider it a good place to discuss them here as they relate not only to creativity but also to madness and hypnagogia both through their nonrational-unconscious character and their originality as represented by the qualities of novelty, unpredictability, uniqueness and surprise.

Further to his comments above Housman offers a personal example illustrating the process of inspiration. Having drunk a pint of beer at luncheon, he says, he went for a walk during which, thinking of nothing in particular, would flow into his mind unexpectedly,

Sometimes a line or two of verse, sometimes a whole stanza at once, accompanied, not preceded by a vague notion of the poem which they were destined to form a part of. Then there would usually be a lull of an hour or so, then perhaps the spring would bubble up again. I say bubble up, because, so far as I could make out, the source of the suggestions thus proffered to the brain was an abyss which I have already had occasion to mention, the pit of the stomach.

(Housman 1952, p.91).

Earlier on he calls this process "a secretion".

There are two points in this excerpt I consider relevant to my discussion. The first comes out of Housman's noting that his conceiving a line or two of verse or a

whole stanza is accompanied by a vague notion of the whole poem. This is very much like the feeling of significance encountered in hypnagogia. In most cases of course it remains just a feeling, undirected and unattached. Sometimes it is the beginning of a flash of insight, as in Kekulé's case. And yet on other occasions it constitutes an intimation of an impending poetic inspiration, as in Miller's (1906) case (see also her hypnagogic poem "The Moth to the Sun" reported in the same paper).

The second point is his reference to inspiration as a secretion and as having its source in the pit of the stomach, i.e., as being 'visceral'. Similarly, Williams (1922, p.261) speaking of the phenomena of intuition said that "the primitive, the visceral, the unconscious mind gives information to the conscious, and like the experienced judge, it announces its conclusions but withholds its reasons". Jung (1946) defined intuition as "that psychological function which transmits perceptions in an unconscious way". Berne (1949) noted that "directed participation of the perceptive ego interfered with intuition" (p.219) and that "when the perceptive ego was not directed the activity of some other function could be 'felt'". He further argued that "to understand intuition, it seems necessary to avoid the belief that in order to know something the individual must be able to put into words what he knows and how he knows it. This belief, still common since Freud, is the result of what appears to be an over-development of reality testing" (p.223). These are descriptions that take us, once more, back to primitive, regressive mentation, the unconscious, and sub-cortical activities. In a study on inspiration, Kris (1939) notes that the literal meaning of the term refers to the influence of the spirit of God or some supernatural power and that in its metaphoric sense the term is characterized by the quality of externality. It is thus also autonomous and unpredictable. Kris points out that in their purest form states of inspiration are found in primitive society:

They are mostly connected with a partial loss of consciousness and are almost habitually accompanied by various sorts of more or less unco-ordinated motor

activities.

The clinical classification of these states is not always easy. They sometimes shew characteristics of epileptic or - perhaps more frequently - hysterioepileptic states (*morbus sacer*) or else a more or less complicated hysterical symptom formation. But while there seems to be a certain variety of clinical syndrome which may predispose to these states, the psychological conception of the belief in inspiration and of the processes occurring in it aims at a solution that will not be limited to any of these clinical conditions. These highly complex processes may be described as phenomena of regression. In clinical cases this regression is likely to lead to a withdrawal of ego control from many of the higher mental activities. As an example we have mentioned that the coordination of motor activities is frequently affected. To add another most characteristic feature, in states of inspiration speech becomes automatic.... It is the voice of the unconscious.

(Kris 1939, pp.378-379).

Although it is not argued that hypnagogia is always and in all respects a state of inspiration, it will be noted that the features described by Kris as present in a trance-like state of inspiration are encountered in hypnagogia: primitive, regressive, epileptic-like, motor automatism, ego withdrawal, automatic and autonomous speech, these are terms already used to describe hypnagogia. It would also appear that inspiration could be understood as both 'bubbling' and 'babbling' of the unconscious: as the primitive, kinesthetic-visceral feeling of welling up, often with a sense of being filled up and oozing out or over-flowing, and as the irrepressible tendency to let go of all conscious controls over thought, movement, speech, and so forth, resulting, for instance, in talking seeming nonsense. It is encountered in hypnagogia in both of these senses. In the form of 'poetical nonsense', as Housman might have said, it is found in, for instance, neologisms, alliterations, assonance, sound associations, verbal-auditory and visual punning, strange verbal constructions with intimations and undertones of mysticism, philosophy, religion, and poetic grandeur, sometimes reminiscent of Housman's remark that all poetry contains are embryo ideas and suggestions of thought and that "that mysterious grandeur would be less grand if it were less mysterious" (1952,



p.88).

An example from Kretschmer (1934) describing a phenomenon called "Förster's syndrome" and quoted by Koestler (1981, pp.315-16) with comments, may further bring together hypnagogia, the poetic, and the pathological and, in addition, strengthen my argument in regard to sub-cortical or old-brain activities in hypnagogia and hypnagogic-like states. The phenomenon was first elicited by Förster, when, operating on a patient, he manipulated "a tumour in the third ventricle - a small cavity deep down in the phylogenetically ancient regions of the mid-brain". As Kretschmer reports, the manipulation threw the (conscious) patient into a flight of speech

quoting passages in Latin, Greek and Hebrew. He exhibited typical sound associations, and with every word of the operator broke into a flight of ideas. Thus, on hearing the operator ask for a Tupfer [tampon] he burst into 'Tupfer... Tupfer, Hupfer, Hüpfen, hüpfen Sie mal...' On hearing the word Messer, he burst into 'Messer, messer, Metzger, Sie sind ein Metzger, das ist ja ein Gemetzger, metzeln Sie doch nicht so messen Sie doch Sie messen ja nicht Herr Professor, profiteor, professus sum, profiteri'.

(Kretschmer: quoted by Koestler 1981, pp. 315-6).

Koestler comments:

Förster's patient opened up a curious insight into the processes in the poet's brain - in an unexpectedly literal sense of the word. The first flight of ideas, Tupfer, Hupfer, etc. - 'tampon, jumper, go and jump into the air' - has a gruesome kind of humour coming from a man tied face down to the operating table with his skull open. The second flight, translated, runs as follows: Messer, Metzger, etc. - 'Knife, butcher, you are a butcher in a butchery; truly this is a massacre [Gemetzger]; don't go butchering [metzeln], take measurements [messen]; why don't you measure, Herr Professor, profiteor, professus sum', and so on.

Thus the patient's apparently delirious punning and babbling convey a meaningful message to the surgeon - his fear of being butchered, and his entreaty that the surgeon should proceed by careful measurements, that is, in a more cautious, circumspect way.

(Koestler 1981, p.316).

Openness and self-actualization:

Hallman's (1967) criterion of openness encompasses

sensitivity, tolerance of ambiguity, self-acceptance, and spontaneity. "Defined as traits by most psychologists, these conditions are learned and are not aspects of man's inheritance; they are environmental factors". He makes reference to Rogers' (1961) category of openness as

the opposite of psychological defensiveness, when to protect the organization of self, certain experiences are prevented from coming into awareness except in disturbed fashion.... It means lack of rigidity and permeability of boundaries in concepts, beliefs, perceptions and hypotheses.

(Rogers 1961, p.353).

The trait of sensitivity, Hallman explains, "refers to a state of being aware of things as they really are rather than according to some predetermined set" (p.28). He calls the roll of those who have supported these ideas as follows: Angyal (1956), Fromm (1959), Mooney (1956), Guilford (1959), Stein (1953), Lownfeld (1958), Greenacre (1957), Hilgard (1959). To these I would add Cropley (1978 p.123) who proposed that "those people whose cognitive style involves the least censoring of the information available in the external world are most likely to be creative thinkers".

Tolerance of ambiguity refers to the ability "to tolerate inconsistencies and contradictions, to accept the unknown, to be comfortable with the ambiguous, approximate, uncertain" (Hallman 1967, p.28). Out of sensitivity and tolerance of ambiguity comes flexibility one implication of which is the ability "to perceive meaning in irrelevancies" (p.28). The condition of self-acceptance, again, follows from that of tolerance of ambiguity since "the creative person... needs to rely upon his own sensitivity for guidance" (p.28). Finally, spontaneity "gives the creative act the feeling of being free, autonomous, undetermined. It allows creative behaviour to be unbound and uncoupled from previous causal conditions" (p.29).

Guilford (1950), in a factorial analysis of the personality of creative scientists, technologists and inventors, proposes the following eight traits: sensitivity to problems, fluency (i.e., the ability to produce "a large number of ideas per unit of time" p.452), novelty, flexibility

of mind ("the ease with which one changes set" p.452), analysing ability (as a complement to organizing ability), reorganization or redefinition of organized wholes ("transformation of an existing object into one of different design, function or use" p.453), complexity or intricacy of conceptual structure ("how many interrelated ideas can a person manipulate at the same time" p.453), evaluation. However, he expresses the reservation that not all of these traits might be applicable to all forms of creativity. Furthermore, he decries theories postulating stages (e.g. Wallas, 1926) because they are untestable and merely chase the problem out of sight. On the other hand, McKellar (1963, pp.131-132), equating the concept of 'creativity' with that of 'originality' points out that "an individual may exhibit high originality on one occasion and remarkably little on others" and suggests that "it may often be more fruitful to regard the term like 'originality' as descriptive of instances of behaviour rather than underlying personality traits".

However the case may be, most of the conditions referred to above are to be found, in one form or another, in hypnagogia. This is not to say that hypnagogic subjects are necessarily endowed with these traits but that the state of hypnagogia is conducive to their emergence, that is, hypnagogia may represent one of McKellar's "instances of behaviour" characterized by creativeness. We have already seen that the hypnagogic subject is open to pre-conscious elements. Hallman (1967, p.28) notes that the creative person is sensitive to "unconscious impulses", among other things. A wider aspect of openness in hypnagogia was discussed in chapters 7 ("Suggestibility-Receptivity") and 8. Throughout this paper we saw that the hypnagogic subject is sensitive to internal activity, e.g., imagery, ideas, impulses, intuitions; that boundaries of the self and of concepts are fluid and permeable; that psychological openness as opposed to defensiveness is the sine qua non of hypnagogic induction and progression. In hypnagogia the subject accepts approximations, ambiguities, and contradictions. He may be thought of as 'fluent' in

the sense of producing a large number of images which are characterized by spontaneity and autonomy, 'flexible' in terms of "the ease with which he changes set" and the variety and changeability of his imagery. In respect to the latter it is interesting to note Hudson's (1975) remark that persons whose imagery is overly flexible are like "nomads" in regards to their inner and outer world, that their ego boundaries are poorly maintained and they tend to differentiate neither between their own inner and outer life nor between themselves and other people - observations pointing, once again, to the LEB. Further the hypnagogic subject reorganizes or redefines in the sense of transforming an existing object into one of different design or function, and his conceptualization is often complex, consisting of intricate crossings of FsOR.

In respect to self-acceptance the hypnagogic subject may be said to be in a state of 'forced self-acceptance', that is, he is placed, by the very nature of hypnagogia which requires relaxation and abandonment, in a position of allowing normally constrained or simply unconscious mentation to come freely to the fore. It is true that this form of self-acceptance does not entirely coincide with that proposed by Hallman; also, hypnagogic imagery and thought are generally characterized by the feature of 'externality', of transpiring 'outside' the subject, and thus the hypnagogic subject may be thought of as transferring reliance onto something outside himself. However, we have only to reflect on cases like those of Kekulé, Poincaré, and Hadamard to understand that acceptance of spontaneous and autonomous thoughts and images which have the appearance of externality does not necessarily imply reliance on factors lying outside the subject - such reliance, as already seen, is related to set and setting.

Again, the tolerance of ambiguity in hypnagogia is both 'forced' and necessary. It is 'forced' in the sense that it occurs irrespective of the personality of the subject, and necessary because there must be no sense of unacceptable ambiguity in the mind of the subject as he enters the state: there must be relaxation and a diffuse feeling

of certainty that ambiguities, incongruities and contradictions will either be resolved in due course or they are just what they are and should be taken in one's stride.

\* \* \*

Hallman's criterion of self-actualization logically "rests upon the category of change as an explanatory principle" (op. cit., p.25). Psychologically, this is spoken of "in terms of motivation as the energy source for change, and of growth in the direction of psychological health as the goal toward which this energy is directed. This category must account for change as transformation and as transcendence.... It implies that though all personality change may not terminate in growth, all instances of personality growth are possible grounds for creativeness... it identifies creativity with self formation, and therefore implies that unless significant transformation occurs in personality during an activity, that activity will fall short of the creative" (p.25).

Maslow (1956), Hallman (op. cit., p.26) points out, equates creativity with the state of psychological health, and this with the self-actualizing process. He further notes that "this criterion also asserts a connection between motivation and creativity, for the self-actualizing person is characterized by an unusually strong motivational drive" (p.26).

Now, in hypnagogia though there are many changes these are mostly fleeting and transient. However, various writers (e.g., Vogel et al 1966; Green et al 1971b; Budzynski 1972, 1977; van Dusen 1972; Stoyva 1973) have pointed to the therapeutic value of hypnagogia. Sometimes, this is done in relating hypnagogia to the creative process (Crichton-Brown 1895; Tauber and Green 1959; Green et al 1971b) through which it may be related to mystical experience due to their common connection with preconscious mentation (Greeley 1974) - and through the latter, once more, to creativity (Kubie 1958).

If the process of self-actualization is seen as a

progressive integration of the personality wherein the individual comes to strike a balance between the conscious and the unconscious, the rational and the nonrational, then hypnagogia may play a twofold major role in the achievement of such a goal: firstly, it may contribute directly to the realization of the target, and secondly, it may point to an underlying aetiology and provide the framework for understanding the presence of the particular traits characterizing the self-actualized person.

To begin with, in respect to Hallman's remark that "all instances of personality growth are possible grounds for creativeness", hypnagogia may constitute such an instance in the sense of facilitating self-acceptance and personality balance characterized by practically all of the features of Maslow's (1968) creative personality, viz., spontaneity and effortlessness, expressiveness and innocence, lack of fear for the uncertain, ambiguous or unknown, ability to tolerate bipolarity and ability to bring together and integrate opposites. It might, of course, be argued that neither creativity nor hypnagogia are always instances of personality growth, if the latter is understood in the strict sense of healthy growth. There are many cases of powerfully motivated geniuses who were far from reflecting healthy personalities, just as hypnagogic imagery may occur in individuals irrespective of their state of physical or psychological health.

Nonetheless, hypnagogia, because of its character of bringing to the surface unconscious material, may act as a diagnostic screen against which is projected both the physiological and psychological state of the individual. Evidence from various sources (e.g., Silberer 1965; Leaning 1925; Vihvelin 1948; Oswald 1962; van Dusen 1972) suggests that somatic, psychosomatic, and psychological states are reflected in the contents of the subject's hypnagogic imagery.

(Germane to this aspect of hypnagogia are Head's (1901) findings of mental changes and images that accompany visceral diseases. In the same vein, Leaning (1925, p.331 footnote 3) notes that attacks of headache may be

accompanied by visions of "the battlements of a fortress".)

Significantly, on the psychological level various writers, e.g., Silberer (1965), Slight (1924), Kubie (1943), McKellar (1957), Foulkes and Vogel (1965), Vogel et al (1966), Schneck (1968), van Dusen (1972), Oliver (1976), Budzynski (1977) have shown that hypnagogia is a most fertile period for the emergence of symbols and for symbol-interpretation. Moreover, Silberer's (1965) idea of "functional" symbolism in hypnagogia argues (a) for a type of 'dream' symbolism which is independent of repression of censorship (Piaget 1951), and (b) for "anagogic" interpretation (Silberer 1971), i.e., for states or processes to be realized in the future, thus relating present preoccupations with problems and their possible future resolution (see Griffiths 1935; French and Fromm 1964; Oliver 1976, for similar arguments in respect to nocturnal dreams).

In addition, hypnagogic symbolism appears to contain both Freudian references to the outside world as well as integrative Jungian (1966) representations wherein aspects of the subject's personality are symbolically manifested (Oliver 1976). More important, the Foulkes et al (1966) study showed that good hypnagogic subjects reflect personalities with positive characteristics. As Green and Green (1978) remarked:

Is it not interesting that, on the one hand, many outstanding creative people have reported their greatest insights... were associated with reverie and hypnopompic imagery, and, on the other hand, the imagery and insights reported by college students in the theta training project involved changes in their personal lives.... These are also amenable to insight, intuition and creativity.

(Green and Green 1978, p.149).

Budzynski (1972) suggested that the findings of Foulkes et al (1966) may be used to advantage by training less positive subjects to become more tolerant of others, less dogmatic, and better able to express their feelings simply by training them to enter and remain in hypnagogia for increasing intervals. Personality changes and treatment for depression and obesity, inter alia, might also be facilitated by the use of hypnopaedic programmes utilizing hypnagogia (Budzynski 1977).

The important but controversial area of hypnopaedia or sleep learning (e.g., Leuba and Bateman 1952; Stampf 1953; Simon and Emmons 1955, 1956; Svyadoshch 1968; Rubin 1968, 1970) has involved hypnagogia in as much as the latter's definition includes stage 1 of sleep during which stage the subject is said to be highly suggestible and receptive.

The early stages of hypnagogia may also be utilized for their beneficial effects of psychophysical relaxation (e.g., Jacobson 1929, 1970), especially when combined with autogenic practices (e.g., Schultz and Luthe 1959).

Thus, hypnagogia may indeed contribute directly to the process of self-actualization (i) by facilitating the emergence of unconscious material, and (ii) by aiding in the acceptance and integration of such material into an expanding personality either by simply allowing the material to surface or by utilizing the receptivity of the state to suggest positive personality changes.

Secondly, Maslow's features of the self-actualized personality listed above are typically psychological aspects of the root phenomenon of the LEB which characterizes hypnagogia. Thus, the latter's central feature of the LEB may account for the presence or emergence-development of the traits characteristic of self-actualized, creative, individuals.

#### Summary and Conclusion:

In this chapter the relationship between creativity and hypnagogia was discussed. In doing so, an analysis of the mental state of the individual in the creative process was carried out and was found to agree in most important respects with hypnagogia. Conversely, hypnagogia was shown to contain all of the necessary and sometimes all of the sufficient, conditions of creativity.

It was further seen that creative thinking shares many dynamics with schizophrenic mentation, and that a greater understanding of these two states or conditions can be gained through the study of hypnagogia which typically accommodates both. It was suggested that this understanding



could be achieved if the phenomena of creativity, like those of schizophrenia, are viewed as functions of the LEB which is a defining feature of hypnagogia.

In conclusion, it can be said that hypnagogia is a state conducive to creativity, it can constitute an essential part of the creative process, and it often contains the act of creation itself - indeed, the moment of illumination or insight is, not infrequently, indistinguishable phenomenologically from hypnagogia, save for the fact that it does not lead to sleep and that when it occurs in hypnagogia it causes the latter to terminate.

## CHAPTER 14

### OTHER AREAS OF EXPERIENCE:

Under this heading I shall discuss very briefly a number of other states, processes, and experiences which share various phenomenological and cognitive-affective features with hypnagogia.

#### Epilepsy:

In his Cavendish lecture Crichton-Browne (1895) drew attention to the observation that dreamy mental states in epileptics tend to come on "almost invariably in solitude" and that they are particularly prone to show themselves "during the invasion of sleep, when the brain is freed to a large degree from external solicitations and volitional control, and is in a transitional state" (p.5). Referring to one of his patients he noted that his attacks occurred occasionally in the afternoon or early evening, "and by far most frequently as he was undressing to go to bed. As they wore off in adult life the last vestiges of them were experienced while he was drowsy and just falling to sleep" (p.4). Of another young patient he wrote:

Objects at which she gazed intently sometimes grew smaller and smaller and receded into distance, and this experience was always followed by a feeling of sleepiness for a few minutes. When just falling asleep she would often hear a low murmuring, crooning noise, as if someone were sneering at her — a sound which was horrid and created alarm, and was so real that she was obliged to jump up in bed and rub her ears. At other times when falling asleep she would have a loud dinging in her ears, and while still awake, but lying with closed eyes, she often saw long black figures which changed into little dumpy white ones.

(Crichton-Browne, 1895, p.5)

Crichton-Browne also noted that epileptic attacks come on "almost invariably in solitude" and when the patient is in a meditative mood, whereas they are prevented when in company and when attention is engaged actively, that they

can be induced by autohypnotic practices (e.g., gazing at one's face in the mirror), and that they are usually accompanied by a feeling of loss of personal identity.

As in hypnagogia, loss of orientation is another known phenomenon occurring also in epilepsy, some other features of the latter being hallucinatory smells such as those of rotting vegetables, rancid fat or burning rubber, hypnagogic visions, sounds and voices, déjà vu experiences — known collectively as "intellectual auras". Queasy feelings, "sexual smells", and "erotic sensations in the genitalia" (Sedman 1966) are also not atypical of epileptic visceral sensations.

Epilepsy, like hypnagogia, contains a wide spectrum of alterations of consciousness ranging from minor disorientations and quasi-hallucinations to full hallucinations and loss of consciousness. The hypnagogic or hypnagogiclike quasi-perceptual elements in epilepsy take on various forms and, as just noted, appear in all modalities. In the visual sphere, and often prior to the attack, they may develop from flashes of light (e.g., a yellow and white flickering) to a complete scene that appears as a comic strip (Beck and Guthrie 1956). One patient described as part of his attack "'cartoon-like' pictures which appeared in his mind's eye, projected as if just in front of him and which he could see with his eyes open or closed... Although he saw them in his mind's eye they were somehow not part of him and experienced as being beyond his evocation or control" (Sedman 1964). Penfield and Perot (1963) refer to the occurrence of "interpretive illusions", that is, to experiences in which, for instance, sounds appear louder or clearer, nearer or more distant, and visual perceptions are distorted (paliopsias). As in hypnagogia, epileptic patients often hear their names being called and may, likewise, hear nonsensical comments. Thus, Sedman (1964) reported of a patient who "often heard her name called 'Edith', which seemed to come <sup>from</sup> just behind her, usually like a whisper and in her father's voice". Another patient "heard a voice which commented thus 'She does look queer - she's not working". Sometimes the

experiences are clearly psychotic, such as hearing the voices of men and women threatening to kill the patient or making insinuations as to the patient's sexual relationships (Sedman 1964). Not infrequently, voices and visions are of a religious character (Slater et al 1963). Some epileptics experience a "sense of power and control" and have a "clearer head and a clearer understanding" during their attacks (Sedman 1966).

The remarkable phenomenon of autoscopy, i.e., of seeing oneself as a double, is occasionally reported by epileptics. For instance, a patient reported: "I suddenly saw myself as if drawn away from my body — it was like looking at a mirror — I was stood a few feet away from myself, clearly outlined.... The actual experience to me was as if I were dead and looking at my body — I don't speak — it is just like somebody standing there" (Sedman 1966, pp.6-7).

Thought and speech disorders like those occurring in schizophrenia also occur in epilepsy (see, e.g., McLean 1964). These include: thought withdrawal and thought intrusion, thought blocking, allusive answers, neologisms (Slate and Beard 1963). Thoughts and speech in which punctuation is almost entirely absent (Sedman 1966, pp.8-9) and thoughts and words that succeed each other in the manner that hypnagogic visions do are apparently relatively common with epileptics. Further, the schizophrenic-like aspects in epilepsy are sometimes so strong that categorizing the patient as schizophrenic or epileptic becomes problematic, as in the case of van Gogh (see Riese 1958, and Navratil 1959). Furthermore, Sedman's (1966, p.8) observation that sometimes occurs in epilepsy "a delusional mood (paranoid mood, delusional atmosphere, or Wahnstimmung) in which there is a feeling that there is something mysterious or unnatural going on", may be closely related to the feeling of a sense of significance encountered in hypnagogia.

An interesting phenomenon that occurs in epilepsy and is also linked with hypnagogia is the *déjà vu* experience. McKellar (1957, p.54) found that *déjà vu* experiences

occurred in more than 69% of his subjects, suggesting that they are quite common in normal individuals. Reed (1972, p.111) proposes that "perhaps we do experience déjà vu more often than we think, but discount the experience or fail to pay attention to it". Cognitive psychology considers déjà vu to be an illusion of recognition: in it the person has the feeling of 'having lived through this before'. A typical example would be the case of a person who visits a particular place for the first time and is inundated by a feeling of familiarity and the knowledge of the topographical structure of the place, e.g., he knows that at the second turning on the left there is such and such a shop or house. A distinction is often drawn between visual déjà vu, as in the above example, and auditory déjà vu. A typical case of the latter is given by McKellar (1957, p.55): "I feel I know what is going to happen a moment before it actually does — also what a person is going to say. In the latter case I feel I know each sentence before it is said, but on one occasion a whole conversation seemed to flash through my mind before it was spoken". Buck and Geers (1967, p.151) reported significant positive correlations between incidence of hypnagogic imagery and visual ( $r=.35$ ) and auditory ( $r=.27$ ) déjà vu in their 91 student sample. Holt (1972) in his sample of 28 students found a near significant positive correlation ( $r=.32$ ) between hypnagogic imagery and "miscellaneous" types of experience, viz., synaesthesia, recurrent images, hallucinations, body image changes, negative hallucinations, and déjà vu (*ib.*, pp.18-20). Earlier, Ellis (1897) had claimed that déjà vu is a common experience in hypnagogia, and Isakower (1938) related the similarity of feeling between déjà vu and "oral cathexis" in hypnagogia. In hypnagogia, in the epileptic aura and in the experience of déjà vu, Isakower (*ib.*, p.336) argues, "the subject knows, or thinks he knows, exactly what is going to happen".

Perceptual isolation and sensory deprivation:

At first sight the evidence for positive relationships between, or equatability with, hypnagogic and sensory deprivation experiences is conflicting. For instance, Freedman and Greenblatt (1960), Freedman et al (1962), and Lilly (1956) argued for the presence of hypnagogic imagery in sensory deprivation experiments. Zuckerman and Cohen's (1964) reports argued for reported visual sensations (RVSs) occurring only in wakefulness (see also Bexton et al 1954), and Leiderman's (1960) reports contained RVSs both in wakefulness and in drowsiness.

The confusion as to what exactly RVSs are plays an important part in the interpretation of these phenomena illustrated in the various names they have been given: "visual" and "auditory images" (Bexton et al 1954), "hallucinations" (Vernon 1966; Vernon et al 1958), a kind of "hypnagogic imagery" (Freedman et al 1962), "reported visual sensations" (Myers and Murphy 1962), "non-object-bound (n.o.b) sensory phenomena" (Scheibel and Scheibel 1962). Further, the term "sensory deprivation" describing experimental conditions of absence or marked reduction of sensory stimulation is loosely exchangeable with the term "perceptual isolation" which stands for invariant or monotonous experimental settings (Brownfield 1965). But relative invariance of stimulation is one of the necessary components of the hypnagogic syndrome, and so is marked reduction of stimulation.

Arguing against the equatability of hypnagogic and sensory deprivation imagery, Schacter (1976, p.464), following Zuckerman and Hopkins' (1966) argument that if the RVS - hypnagogic parallel were valid then persons who doze and sleep frequently during isolation should have more RVSs than persons who remain alert, presents evidence from the Goldberger and Holt (1958) study showing no correlation between RVSs and time spent sleeping and the Holt and Goldberger (1961) investigation showing a  $-.66$  correlation. He also cites the Zuckerman et al (1962) findings that showed a  $-.71$  correlation between sleep

ratings and RVS complexity, and the Murphy, Myers, and Smith (in Zuckerman and Cohen 1964) study showing that subjects who reported frequent episodes of drowsiness also reported less complex RVSs than did alert subjects.

Schacter's first argument is invalid in that it assumes that incidence of drowsy episodes and sleep should correlate with RVSs. This assumption appears to ignore subject variables, the attentional state of the subjects, and the occurrence of sensations in other sense modalities - in particular kinesthetic and somaesthetic sensations (see Leiderman 1960). People in non-experimental situations that feel drowsy and fall asleep more often than others do not necessarily have more visual hypnagogic hallucinations than the latter: besides individual differences that may show predilection for a particular sense modality, the actual attentional state of the individual is of great import as it may influence the latency of the emergence of the experience, the type of visual experience (e.g., complexity, meaningfulness), and the modality involved - attentional shift is also of import. In addition, in sensory deprivation the results and their interpretations are also subject to other interacting conditions such as kind and duration of confinement and criteria for the classification of the experiences.

These objections will also apply to Schacter's second argument. In addition, attention must be drawn to the observation that RVSs, just like visual hypnagogic experiences, appear in degrees of complexity (Hebb 1954, Myers and Murphy 1962, Zuckerman 1964) stretching from dots and lights to lines and simple geometric patterns, 'wallpaper' patterns, isolated objects, and integrated scenes. Zuckerman (1964) reviewing the literature found that the majority of reported visual and auditory sensations in sensory deprivation experiments were "unstructured". It is not unlikely that being "alert" in the Murphy et al study stood for making efforts to think while drowsing lightly, in which case complex autosymbolic phenomena might have emerged. The parameter of effort to think while drowsing was, unfortunately, not considered in this study.

Findings in respect to correlations in incidence of prior history of hypnagogic images and sensory deprivation imagery are conflicting: Whereas Freedman et al (1962) found significant positive correlations ( $p=.05$ ), Holt (1972) found insignificant correlations ( $r=.29$ ). However, as Schacter (1976, p.465) rightly points out, prior history of hypnagogic imagery was assessed by means of the method of "highly unreliable" questionnaires. Interestingly, in two studies by Holt and Goldberger (1959, 1961) where Block's MMPI scale for neurotic under-control was applied the negative correlations with imagery frequency that were obtained were interpreted as "reflections of the intellectual flexibility and emotional freedom clusters" forming part of an "adaptive reaction" reminiscent of the Foulkes et al (1966) personality findings in respect to hypnagogia.

Further, neither Holt's (1964) argument that to refer to all sensory deprivation phenomena as hypnagogic is an oversimplification nor Schacter's (1976) contention that sensory deprivation phenomena are a potpourri of daydreams, fantasies, hypnagogic images, and dreams, are properly justified. Reviewing the literature one cannot help but be struck by the phenomenological richness of hypnagogia within whose boundaries are encountered all of those phenomena that occur in sensory deprivation. Moreover, a careful examination of the conditions of hypnagogia reveals that both spontaneous as well as experimental induction of the state is clearly achieved, as noted earlier, by a considerable degree of perceptual isolation.

#### Hallucinogenic drug induced states:

In 1895 Prentiss and Morgan initiated the systematic investigation of the hallucinogenic properties of mescaline and in the following year Mitchell (1896) drew attention for the first time to the similarities of mescaline and hypnagogic experiences, and in particular to the autonomous nature of both and to the tendency of the former to become intensified during sleep onset. Other workers since



(e.g., Hollingworth 1911; Klüver 1928a, 1942; Rawcliffe 1952; McKellar and Simpson 1954; Ardis and McKellar 1956; Caldwell 1968) have confirmed Mitchell's observations and exposed additional similarities.

Klüver (1928a, pp.36-39) identified "form constants" that occur in both, viz., (a) grating, lattice, fretwork, filigree, honeycomb, chessboard-design, (b) cobweb figure, (c) tunnel, funnel, alley, vessel, (d) spiral. In addition, he noted that mescaline visions are characterized by (1) a large variety of colours, (2) intense brightness, (3) unusual saturation of colour, (4) sourceless illumination, (5) lack of "an exact egocentric localization", (6) microscopic clarity of detail, (7) autonomy, (8) continuous and rapid change. The size of the objects seen may be "gigantic" or "lilliputian" (macropsia and micropsia) although Klüver's personal experiences were solely of the latter kind. Images of objects sometimes appear distorted (dysmorphopsia) and in multiples of themselves (polyopsia). In most cases when a subject tries to visualize a particular image a similar or related one appears.

A very interesting observation is the occurrence of what Klüver (1928a, p.56 et seq.) called the presque vu-experience, that is, the experience of the feeling of incompleteness as one views a vision, accompanied by a sense of hidden significance often of cosmic dimensions. This may often be the result of minute and apparently irrelevant details acquiring central importance and significance. Voices are sometimes hallucinated, and so are tactile or haptic sensation (e.g., sensations of hot or cold in various parts of the body). There are also olfactory and kinesthetic hallucinations and body-schema distortions, e.g., shortening or lengthening of limbs, swelling, shrinking or melting away of the whole body; "irregular muscular contractions may take place in different parts of the body, yet the subject may doubt that the muscles belong to his body" (ib., p.95); synesthesias are also reported, e.g., the hearing of rhythmically presented sounds accompanied by the seeing of small grey circles. In some cases the drug may cause such a "marked depression

of the muscular system" as to render the subject unable to stand up. The ability to think and to organize and abstract material diminishes or disappears. Although consciousness is narrowed down to the experience of sensory and imaginal details, these details expand and the subject becomes identified with the object (ib., pp.104-105).

As with hypnagogic experiences there is here also a progression from simple to complex (Klüver 1928a; Leuner 1963), from clouds of colour and sparkles of light to geometric figures and patterns to landscapes, faces, and complex scenes.

Klüver (1942) concluded that mescaline and hypnagogic experiences involved the same processes. The same conclusion was reached by Ardis and McKellar (1956) who also confirmed the phenomenological similarities between the two states emphasized earlier by Klüver.

Richardson (1969) hypothesized that previous experience of hypnagogic imagery should facilitate the experiencing of meaningful hallucinogenic imagery. Although this hypothesis has not yet been tested, Holt (1972) found a zero correlation between intensity of LSD imagery and previous experience of hypnagogic imagery. McKellar and Simpson (1954) and Smythies (1960) found that subjects that were given hallucinogenic drugs during sensory deprivation and photic stimulation experienced facilitation in their RVSSs.

#### Photic, pulse current, and direct electrical stimulation:

Experiments of photic stimulation with stroboscope (Costa 1953; Smythies 1960; Freedman and Marks 1965; Horowitz 1967), excitation of the brain by means of externally attached temporal electrodes (Knoll and Kugler 1959, 1964; Knoll et al 1962), direct electrical stimulation of the visual cortex (Penfield and Rasmussen 1950; Penfield 1958; Ishibashi et al 1964; Horowitz et al 1968; Horowitz 1973) have yielded all the phenomena of hypnagogia ranging from flickers of light (Knoll et al 1962)

to more meaningful 'objective' phenomena such as animals and reminiscences (Penfield and Rasmussen 1950; Penfield 1958; Horowitz 1978). Oswald (1960, 1962) has observed that rhythmic photic stimulation for a few seconds causes the disappearance of alpha rhythm in the EEG of the subject.

Further, (a) subjects that experience a great amount of imagery during photic stimulation fall into the same category as those people that experience freely hypnagogic imagery, and are characterized by the possession of an artistic, sensitive and creative self concept which is found to relate to a syndrome that includes imagery (Holt and Goldberger 1959; Goldberger and Holt 1961; Foulkes et al 1966; Richardson 1969), (b) prior history of naturally occurring hypnagogic imagery was found to be related to the incidence of visual imagery experienced in rhythmic photic stimulation (Freedman and Marks 1965, Richardson 1969), (c) the external conditions of photic and pulse current stimulation are similar to those under which hypnagogic imagery occurs, i.e., lying on a bed with closed eyes in a dark and quiet room, (d) electrical stimulation "induces a state of consciousness which makes it more probable that primary-process modes of functioning will prevail" (Mahl et al 1964, p.36; see also Horowitz 1978).

#### Eidetic imagery:

A close look at the literature on eidetic imagery (Galton 1880; Allport 1924, 1928; Klüver 1926, 1928, 1930, 1932; Jaensch 1930; Teasdale 1934; Purdy 1936; Meenes and Morton 1936; Luria 1975; Haber and Haber 1964, Doob 1965) reveals some striking similarities between eidetic and hypnagogic imagery: (a) clarity of detail and three-dimensionality, (b) externality of localization with eyes open or shut, (c) relatively clear distinction from after-imagery and memory, (d) like the hypnagogic kind eidetic imagery may occur in other sense modalities (Purdy 1936, Sheehan 1968), (e) as with hypnagogic imagery there are

"degrees" of "strength" in eidetic imagery, (f) functionally they may both subserve an earlier, easier, concrete, percept-like form of cognizing (e.g., Luria 1975; Doob 1964, 1965; Siipola and Hayden 1965).

But there are also striking differences between eidetic and hypnagogic images: unlike the latter, the former (a) are scanned, (b) persist much longer (Luria 1960, Doob 1965), (c) they always result from definite perceptions, (d) their size depends on the original perceptions, (e) often greater control can be exerted over them, although this is restricted to normal and plausible alterations (Allport 1924, Gengerilli 1930).

A number of writers (Ferriar 1813; Müller 1848; Ward 1883; F.W.H. Myers 1903; Titchener 1916; Warren 1921; Leaning 1925; Goodman and Downey 1929; Leroy 1933; Vihvelin 1948; Hanawalt 1954; McKellar 1957, 1979b; Oswald 1962) have drawn attention to the apparently common hypnagogic phenomenon called variously "recurrent sensations", "cerebral after-images", "recurrent images", "delayed after-sensations", "visions of memory images", "perseverations". This phenomenon, according to Leaning (1925, p.298) is one in which "some scene, or some object has engaged concentrated attention during the day, and an absolute reproduction takes place spontaneously against a background of darkness" at sleep onset (see chapter 4).

Both Hanawalt (1954) and Richardson (1969) have argued for the placing of this phenomenon in the category of after-images, the latter writer in an attempt to distinguish it from hypnagogic imagery on the grounds that its production requires "prolonged and intense retinal stimulation" (Richardson 1969, pp.21-23), and the former in an effort to distinguish it from eidetic images on the grounds that recurrent images (a) occur after long and intense stimulation, (b) are located in the retina, (c) tend to be seen with eyes shut or in very dim light.

The first arguments in both cases is countered by evidence which shows that recurrent images may emerge only after a short attentive glance (e.g. Vihvelin 1948, p.368).

The second argument is likewise unsupported, and the third is only partially true. Further, Richardson's and Hanawalt's argument that recurrent images are "idealized" images refers only to one kind of hypnagogic perseveration, the other being "an absolute reproduction" (see chapter 4 for a more detailed argumentation). Interestingly, Hanawalt closes his paper leaving the argument open to the possibility "of breaking up the eidetic image into two types: recurrent images and visualizations" (p.174). On the other hand, studies like those carried out by Meenes (1933) and Stiipola and Hayden (1965) in which eidetic visions were made to combine into a whole (a) with the background onto which they were projected, and (b) with a succeeding eidetic vision respectively, may throw some light on the formation of the "idealized" perseverative hypnagogic vision.

Oswald (1962, p.96) suggests that no sharp distinction can be drawn between hypnagogic, eidetic, and sensory deprivation imagery.

### Sleep deprivation:

Sleep deprivation may be considered as a condition in which the need for sleep and the effort to stay awake place the subject in a vacillating intermediate state not unlike the naturally occurring hypnagogia. Hypnagogic experiences in sleep deprivation have been noted by, among others, de Boismont (1859), Galton (1883), Kleitman (1967), Tyler (1955), Bliss et al (1959), Bliss and Clark (1962), Oswald (1962). Bjerner (1949), Bliss and Clark (1962), and Oswald (1962) have observed that even slightly sleep deprived persons fall into lapses of inattention or take catnaps even while standing, sometimes not being aware of "falling asleep" (Oswald 1962) and often having "the sensation of floating in and out of consciousness with their eyes open" (Bliss and Clark 1962, p.103). The latter authors group together "the visions of hypnagogic states, dreams, and sleep deprivation" on the grounds that they "have in common the elements of semi somnolence and

altered electroencephalographic activity" (p.105).

The motor behaviour of sleep deprived subjects is erratic (Tyler 1955), they mumble and ramble and slur their speech, mispronounce, repeat, use jargon, change topics for no apparent reason, avoid any task that requires effort or attention (Morris et al 1960). Oswald (1962, p.185) notes that "much of the behaviour of sleep-deprived persons resembles that of drunkenness: sheer incompetence during drowsiness". Body-schema and weight alterations, time and space distortion (Cappon and Banks 1960), macropsia and micropsia (Bliss et al 1959; Morris et al 1960), tactile hallucinations (Morris et al 1960), visual hallucinations such as seeing smoke rising from the floor (Bliss et al 1959), women standing in the room (Tyler 1955; Brauchi and West 1959), and auditory hallucinations (Tyler 1955) are not unusual phenomena in conditions of sleep deprivation. One of Oswald's (1962, p.186) subjects who had bent forward and kissed the EEG paper while having "dream-like thoughts about his girlfriend" recorded his experience by writing "Leant forward and downwards to plant a kiss upon the unmarried letters. £Cooch". A subject of Bliss et al (1959) reported that he had written a "profound statement" whose ending was the irrelevant comment "Owes \$8.00".

#### Dream scintillations:

Various workers (e.g. Forbes 1949; Saul 1965; Horowitz 1966; Horowitz, Adams, and Rutkin 1967; Horowitz 1978) have observed what have come to be called "dream scintillations" or "flickering images", that is, "a rapid succession of images which intrude upon awareness and are difficult to remember" (Horowitz 1978, p.16). Saul noted that these experiences may last up to half an hour, and described them thus:

One feels as though he has just had a dream which he is trying hard to recall. He keeps trying to recall it, but while thus striving in vain, that which he is trying to recall seems to change. Then the realization dawns that this effort to grasp the dream is itself part of a dream state,

a dream state which goes on like a real dream, shiftingly and distractingly, but while one is fully awake and in full command of his behaviour and feelings so that no one else could observe or suspect anything unusual unless it is a slight distraction.

(Saul 1965, p.286)

Dream scintillations often appear after physical exertion but in the absence of drowsiness.

Forbes (1949) having drawn a distinction between three types of dream, one of which was that occurring "at the onset of sleep or during transient dozing in the day", he pointed out that "'dream scintillations' were striking examples" of the latter type (p.160). The contents of these visual experiences were mostly fragments of recent or long forgotten dreams and bits of actual events. Throughout these occurrences, Forbes recounts, "I experienced a strange dreamy feeling, but at no time did I actually doze... They were like the first dream figures of ordinary dozing and they kept on coming in a rapid-fire sequence" (p.160). He noted that during the time he had this "strange dreamy feeling" his memory was confused: he had difficulty in deciding what day it was, and previously familiar names and words were either impossible to recall or looked unfamiliar. On one occasion he reported:

About 12:30, when dream flashes were about maximum, I dictated a fairly long letter to a friend. At 4 p.m., reading over before signing, I noted that much of it seemed strange and unfamiliar. The letter said what I wanted to say, but I didn't recall using some of its phrases. I was surprised at reading what I had dictated.

(Forbes 1949, p.161)

The phenomenological similarities between dream scintillations and hypnagogic imagery need no stressing. Moreover, as Forbes points out, the former are "striking examples" of the latter. Horowitz (1966) suggested the replacing of the term "dream scintillations" with that of "flickering images" on the grounds that these experiences take place when the person is not asleep and "because the event could be a transient change in consciousness due to a minor variant of temporal lobe epilepsy or

migraine" (Horowitz 1978, p.17). The term "flickering images", however, falls short of conveying the mental state of the subject, viz., a dreamy "transient change in consciousness", which is more accurately conveyed by the older term.

#### SUMMARY AND CONCLUSIONS OF PART TWO:

In this part I examined the relationship of hypnagogia to a number of states, processes and experiences, and further expanded my analysis of hypnagogic phenomena. In relating it to hypnosis it was seen that hypnagogia is a natural autohypnotic state - a point already noted in chapter 7. In particular it was pointed out that hypnagogia and hypnosis resemble each other both in their psychophysical induction and experiential aspects. That is, they are both dependent on relative immobilization and monotony or regularity of low intensity stimuli that induce in the subject relaxation and secure expectancy freeing him from distracting affects. Further, they are both characterized by absorbed and fascinated attention, LEB and regression to pre-logical ideational processes typified by the tendency to experience the environment as part of oneself, dissolution of time and time barriers, i.e., everything (including memories) appears to be endowed with the immediacy of the present.

In relating hypnagogia to sleep dreams it was found that the former contains experiences indistinguishable from the latter both in their physiology and their experiential aspects. Moreover, hypnagogia appears to encompass a variety of types of dream as well as inter-dormitum experiences. Further, the fact that the hypnagogic subject may retain awareness of his environment and/or awareness of being 'awake' in a dream argues against the contention that dreams are not experiences and that statements about them are mere inferences about experiences that did not take place. It was further suggested that hypnagogic experiences in general, and hypnagogic and other types of dream in particular, may be correlated with the activities of subcortical structures, thus being in



agreement with theories and data arguing for the 'regressive' nature of dreams and dreamy states.

In respect to the relationship between meditation and hypnagogia, it was, again, found that these share the same psychophysical factors of induction, viz., relaxation, shift to parasympathetic predominance and hypometabolic processes, lowering of EEG to the theta range, psychological withdrawal, ego abandonment, receptive attention leading to absorption-fascination. Non-analytic (non-cortical), 'regressive-primitive' organization of perception and thought was found to characterize both states, as were the presence of unusual sensations, the feeling of intense realness, the feeling of being 'chemically' linked with the world, the inability to describe some of these experiences, the sense of temporal immediacy. It was also argued that meditation tends to lead to hypnagogia and that the latter sometimes breaks out into a state of satori or mystical enlightenment.

Some psi states and processes, viz., telepathy, clairvoyance, clairaudience, psychometry, ecsomatosis and some forms of trance have also been found to be closely related to hypnagogia in their psychophysical induction and their phenomenology. Further, hypnagogia was found to be highly conducive to psi activities while psi states were clearly seen to be hypnagogic in nature, i.e., they tend to lead to sleep. Furthermore, the mentation encountered in psi states, like that of hypnagogia, is typically non-analytic and regressive. Indeed, a close examination of physiological and psychological parameters shows that the above mentioned psi states and processes are only distinguishable from hypnagogia by the subject's set of beliefs and/or the setting in which they take place.

Hypnagogic mentation was further found to contain most of the features that characterize schizophrenic disturbances such as loosening of association of ideas, dissociated thinking, over-inclusiveness in conceptualization, thoughts spoken aloud, hallucinations, delusions, body schema alterations. These phenomena, it is argued, are the direct result of the LEB which facilitates the

breakdown of the filter mechanism operating in the normal, waking state. This leads to a loss of figure-ground relationships and allows the simultaneous emergence and crossing of a number of FsOR which often results in neologisms, punning, poetic or funny remarks and the identification with each other of concepts on the basis of apparently tenuous similarities. Schizophrenics, like hypnagogists and absent-minded individuals, appear to be responding primarily to an internal, imaginal FOR.

Hypnagogia was also found to be conducive to creativity, constituting an essential part of the creative process and often containing the act of creation itself. Specifically, the creative act is characterized by LEB and regression to earlier modes of mentation in which emerging imagery is accompanied by a sense of reality and concepts from apparently unrelated FsOR are connected, combined, or fused. Much of this is effected on an unconscious-nonrational level which, however, can be made conscious through the preconscious character of hypnagogia. Both hypnagogia and creativity are further characterized by their subjects' openness, sensitivity, tolerance of ambiguity, self-acceptance, loosening of ego strictness. Moreover, since both creative thinking and schizophrenic mentation are encountered in hypnagogia, the present analysis of the latter clearly reveals common dynamics and facilitates understanding of both schizophrenia and creativity.

In regards to the relationship between hypnagogia and epilepsy, the former was found to be conducive to the occurrence of epileptic attacks during which many hypnagogic phenomena, known as "intellectual auras", are also present, e.g., loss of personal identity, loss of orientation, visual, auditory, olfactory, gustatory and other quasi-perceptual experiences, thought disturbances, déjà vu phenomena. Hypnagogic phenomena are also found in sensory deprivation or perceptual isolation experiments which are conducted under conditions very similar to those present in the naturally occurring hypnagogia, i.e., reduction and relative invariance of stimulation. Further, hallucinogenic-drug induced states are populated

with quasi-perceptual and cognitive phenomena and features which are very similar to those encountered in hypnagogia — indeed, it is more than likely that both conditions involve the same processes. Photic, pulse current, and direct electrical stimulation experiments have also yielded hypnagogic-like states and phenomena. In addition, eidetic imagery displays strong similarities with hypnagogic imagery such as clarity of detail, externality of localization and three-dimensionality. Sleep deprivation is conducive to the occurrence of hypnagogic experiences and dream scintillations are considered as striking examples of hypnagogic imagery.

In concluding this part of the paper two general observations can be made. First, all of the above states, processes, and experiences possess a measure of hypnagogia, that is, they begin with, lead into, or contain strong features of, hypnagogia. Indeed, some are indistinguishable from hypnagogic experiences both in their phenomenology and physiology. In respect to the latter, the shift to theta rhythms in the EEG and to a parasympathetic predominance have been especially noted. In regards to the phenomenology, the similarities were striking both in the quasi-perceptual and the cognitive-affective spheres. Even in the weakest of cases, a degree of 'dreaminess', psychological withdrawal, and primacy of an internal FOR, were clearly present. This observation contains at least two important implications: one, hypnagogia comprises the psychophysical mechanisms by which these states and processes are produced, and two, the study of the nature and function of hypnagogia will shed light on the nature and function of the above states and processes. These studies constitute, of course, one of the major aims of this paper. The study of the former, i.e., the nature of hypnagogia, has now almost been completed. I say almost, because the study of the phenomenon of LEB, which I consider an important aspect of the nature of hypnagogia, has not yet been offered. This will be undertaken in Part Three which deals with the brain mechanisms and function of the state. The reason for this is that the LEB partakes

both of the nature and function of hypnagogia, that is, it both constitutes an aspect of its phenomenology (hypnagogia is characterized by its presence) and lies at the basis of its evolutionary role. Its study and analysis should, of course, shed light on the possible function of the above states and processes.

The second general observation rising out of the discussions in Part Two concerns the interrelationships existing among the various states and processes. For instance, epilepsy may display all the phenomena of schizophrenia. On the other hand, some well-known creative individuals have been epileptics whereas others have been categorized as schizophrenic. Meditative moods have been found to be conducive to the onset of epileptic fits. The factors of "intellectual flexibility" and "emotional freedom", characteristic of creative individuals, have been found in subjects most susceptible to the emergence of hallucinatory phenomena in sensory deprivation and photic stimulation experiments. Hallucinogenic-drug induced states have been related to psi, creativity, mysticism and schizophrenia: these last four have also been related to one another. Since these states and processes are, severally, strongly related to hypnagogia, their interrelationships strengthen the view that they all share of the nature and function of one central state or process, namely, hypnagogia — a conclusion that takes us back to the significance of hypnagogia as a state whose nature and function underpins some very important aspects of mental life.

**PART THREE**

**BRAIN MECHANISMS AND FUNCTION OF HYPNAGOGIA**

## INTRODUCTION:

In the preceding two parts, in examining the nature of hypnagogia and its relationship to other states and processes, I made occasional reference to subcortical structures as being the brain correlates of hypnagogia. In this part I shall, first, substantiate these claims with specific data and arguments and, then, examine the function of hypnagogia and its role in a wider, evolutionary scheme.

As it will transpire from these arguments, the correlating of hypnagogic experiences with the activities of subcortical structures points both to hypnagogia being evolutionally older than sleep and wakefulness and to its constituting the exemplification of Oneirosis, i.e., the need and readiness to have dreams and dreamlike experiences periodically throughout the 24 hour cycle. This, however, should not be taken as implying that hypnagogia is merely and necessarily 'regressive', i.e., that it merely constitutes a regression to older modes of experiencing and cognizing. There is evidence to indicate that hypnagogia can fulfill the roles of both dreaming and sleeping without necessarily relinquishing waking consciousness totally, and without some of the harmful concomitants of sleep dreams and the full waking state.

Thus, the correlating of hypnagogic experiences with the activities of subcortical structures has a further and most important implication: it indicates that the 'seat' of the mind, so to speak, (and, here, mind is not to be taken as being co-extensive with consciousness) is 'centred' below the cortex, which further suggests that not only is the term 'regression' a biased one used by cortical, rational thinking, but also that so-called 'regressive mentation' is a living, practised mode employed by human adults for purposes other than those aimed at by rationality. The fact that hypnagogia can ride both modes of mentation endows it with the additional significance of becoming an integrative state, a really "special state" by means of which wakefulness may be carried into dreams and dream activities be brought into wakefulness.

CEREBRAL CORRELATES OF HYPNAGOGIC VISIONS

Neurobiologic influences or instigations:

Galton (1883, p.115), discussing his own limited visual imaginal experiences, suggested that "it is most easily conceivable that some very slight physiological change, short of a really morbid character, would enhance their vividness".

Indeed, there are several reports relating the appearance or increase of hypnagogic phenomena to physiological sources. Silberer's (1965) "somatic phenomena", for instance, show clearly how physiological conditions might provide stimuli for the appearance of a hypnagogic vision. On one occasion, while in the state of hypnagogia, Silberer takes a deep breath and has the hypnagogic vision of lifting a table high with someone's help. On another occasion, he reports: "I have a rhinolaringitis with a painful irritation which forces me to swallow steadily. Fever. Symbol: Each time I am about to swallow I have a picture of a water bottle which I am supposed to swallow; after each swallow another one takes its place" (p.206; see also Oswald 1962, p.102). Vihvelin's (1948) "synesthetic visions", too, are thought to be instigated by physiological conditions. One of his subjects, for example, reports the following hypnagogic experience: "An image appears of the outlines of the naked right forearm and hand, - Connection: congestion of that part of the right forearm which corresponds to the image; the characteristic position of the observer's forearm corresponds to the shape seen in the vision" (ib., p.372). Archer (1935) describes hypnagogic experiences which he believes were clearly instigated by sensory stimulation and elaborated by imagination. For example:

To-night I caught dream-scenery in the act of evolving from the spots and patterns that one always seems to see under the closed eyelids. I was lying in my deck-chair after dinner....

Perhaps the eyelid patterns were particularly vivid because of the fact that I was facing towards a broad band of brilliant moonlight on the sea. I was perfectly awake, fully conscious of my personality and my surroundings; but I gradually became aware that I seemed to be contemplating an Eastern scene — an army of men in turbans moving against the light of a dim sky. It was vague — no individual figure or detail stood out distinctly — yet it was quite pictorial, and had even a certain beauty, or so I thought. That it was built up out of the eyelid patterns, I am quite sure. The moment I became fully conscious of it as an illusion it passed back into the shifting shimmer, so to speak, that wavers before the closed eyes.

(Archer 1935, pp.40-41)

He, further, describes the hypnopompic vision of a "sunlit city" that took place one morning as he lay dozing with the sun pouring through his bedroom window straight upon his closed eyes. The vision disappeared as he "became more completely awake" (*ib.*, p.42). Also, all the reproductive and perseverative hypnagogic phenomena (e.g., Warren 1921; Dallenbach 1924; Slight 1924; Titchener 1916; Leaning 1925; Leroy 1933; Hanawalt 1954; McKellar 1957) might be included here as they seem to have their basis in intense physiological (sensory) stimuli.

De Manacéine (1897, p.233) argued that "every nervous stimulus, every sensation or idea, leaves a trace in the cerebro-nervous system, and thus all the obscure motions generated in the organism may afterwards revive temporarily under the impulsion of consciousness, or spontaneously by the action of unknown causes". She points out that Aristotle, too, remarked on this in relation to nocturnal dreaming. In fact, Aristotle (1931, p.461b) argued that images in dreams have their basis in "the movements persisting in the sense-organs" [some form of 'perseveration'?] which are mistaken for true by the sleeping organism. Aristotle continues:

That what we here urge is true, i.e., that there are such presentative movements in the sensory organs, any one may convince himself, if he attends to and tries to remember the affections we experience when sinking into slumber or when



being awakened. He will sometimes, in the moment of awakening, surprise the images which present themselves to him in sleep, and find that they are really but movements lurking in the organs of sense.

(Aristotle 1931, p.462a)

Aristotle is thus pointing to hypnagogic/hypnopompic experiences (a) as having a common instigator with nocturnal dreams, viz., "presentative movements", (b) as being the precedents (hypnagogic) and consequents (hypnopompic) of nocturnal dreams, and (c) as affording a subject the appropriate psychophysical conditions for the observation of dream formation.

Cane (1889) argued that various neurobiologic conditions such as hyperaesthesia or dysaesthesia of one or more nerves, set of nerves, or branches might be the cause of numerous subjective experiences and hallucinations:

in the optic nerve these conditions cause photopsia or flashes of light, flames, sparks, and stars. In the auditory nerve we have humming, buzzing, singing, ringing of bells, violent explosions, and even words or conversations. In the olfactory nerve and nerves of taste we have odours and flavours. Many of these...phenomena are simply the hyperaesthetic nerves picking up the physiological sights, sounds, and sensations.

(Cane 1889, p.1331)

During sleep and adjacent states, he continues, the "intelligism is deprived of its full means to test their nature". Cane further argues that "from the chemical reactions involved, from biological analogy, and from physiological and pathological facts, we have good reason to believe that there is actual light produced within the body itself" (mainly produced by electrical currents and phosphoric acid), and that this light is to account for the visual aspect of dreams and dreamy states.

On a rather occult note, Indian yogis call hypnagogic phenomena vrittis and refer to them as "thought-forms which constitute part of the relaxed brain's excretory mechanism" (D.M. Baker 1980). They are a form of psychophysical energy that becomes released from "a fatigued body

that relaxes rapidly". Along similar lines, Castaneda's (1976, p.131) don Juan says that "at the moment of death... the awareness and memories and perceptions stored in our calves and thighs, in our back and shoulders and neck, begin to expand and disintegrate".

Galton (1883, p.122) hypothesised that "a condition of the presentation of visions lies in the over-sensitiveness of certain tracks or domains of brain action and the under sensitiveness of others, certain stages in a mental process being represented very vividly in consciousness while the other stages are unfelt", suggesting a shift from individualism to dividualism in the organism — an interesting suggestion from which one might infer a causative factor for the initiation of personality split (see McKellar 1979b).

It is relevant to mention here a hypothesis advanced by Deikman (1969b) in connection with the results of a study in meditation. Referring to his subjects' reported perceptions during the experiment, he says:

as far as anyone can tell, the actual substance of the perception is the electrochemical activity that constitutes perception and thinking... If awareness were turned back upon itself, as postulated for sensory translation (the perception of psychic action — conflict, repression, attentiveness, and so forth — via the relatively unstructured sensations of light, colour, movement, force, sound, smell, or taste), this electrochemical activity might itself be experienced as a truth about the outer world, rather than the inner one.

(Deikman 1969b, p.39)

Similarly, one could argue that hypnagogic images might be psychic actions structured into pseudo-sensations through the utilization of sensorial elements such as light, colour, sound, etc., that emerge into recognizable shapes in the subject's highly suggestible mind.

One of Leaning's (1925a, p.152) hypnagogist correspondents suggested that visual hypnagogic images are due to some disturbance of the optic nerve, another pointed to indigestion as having much to do with their appearance. The latter's remark is exactly the same as that made by

Herodotus (1973) in respect to some nocturnal dreams. This is, also, very relevant when related to Head's (1901) findings on mental changes that accompany visceral diseases: "Usually the patient wakes up from sleep to see the figure or face beside his bed... In other cases the hallucination appeared in the evening when the patient was sitting quietly in a dimly lighted room" (ib., p.354). "All those sensations that are associated with visceral activity, which do not exist in consciousness under normal conditions, come to the surface... Reason is displaced... That barrier which the normal mind sets between conscious life and that of the viscera...has broken down" (ib., p.401).

De Manacéine (1897, p.243), on the other hand, suggested that "to some extent, this phenomenon is due to the amount of blood flowing to the brain". Galton (1883, p.122), too, with reference to sleep, proposed that "the absence of common sense during dreams" is due to the brain being imperfectly supplied with blood. Ellis (1897, p.286) argued that hypnagogia is "an enfeebled and impaired state of consciousness" and that it is "a condition of mental feebleness and suggestibility doubtless correlated with a condition of irregular brain anaemia" (ib., p.285). De Manacéine (1897), viewing the hypnopompic state as a "weakened state of consciousness" (ib., p.197) pointed to a dependence of this state on the condition of the vascular system. "The most important condition", she noted, "for the development of half-awakening and of suggestibility we have found to be different anomalies of the vascular system, and especially a want of tonus in the walls of the blood-vessels, and their consequent inertness" (ib., p.215 ; see also Lhermitte and Sigwald 1941 on vagotony in hypnagogia). In experiments on suggestibility she carried out on subjects in the hypnopompic state, de Manacéine noted that subjects woke from this state when ideas or emotions of an exciting type such as joy or anger were suggested to them whereas the suggestion of ideas and emotions of a depressive character did not have this effect. The explanation offered is that

emotions such as anger and joy "are always accompanied by a flow of blood towards the brain" (ib., p.200) and this increase of blood flow to the brain terminates the hypnopompic state bringing the subject to wakefulness.

In contrast, other workers, e.g., Maury 1848, 1878, Guyon 1903, argued, the former mainly on the strength of personal data and the latter in respect to subjects suffering from chorea, that hypnagogic phenomena are causally related to brain hyperaemia and cerebral blood congestion.

Van Dusen (1975, pp.19-20) suggests that Swedenborg's induction and intensification of his hypnagogic and other inner experiences was partly due to the building up of carbon dioxide in the blood resulting from slowing down of breathing. C.P. Kelly (1962) writing on "The natural way to healthful sleep" draws attention to the importance of the presence of a normal sleep onset state as a prerequisite to sleep, and offers a technique for its induction involving increase of the blood's carbon dioxide through shallow breathing.

#### Retinal arguments:

Numerous writers (Gruithuisen 1812; Purkinje: cited by Leroy 1933, p.74; Müller 1826; Maury 1848, 1878; Radestock 1879; Ladd 1892; Binet 1894; de Manacéine 1897; Ellis 1911; Hicks 1924; Warren 1921; Griffiths 1927; Archer 1935; McKellar and Simpson 1954) presented data and argued that hypnagogic imagery is entoptic in origin, that is, it rises out of the physiology and chemistry of the eye. Of interest in this respect is the list of entoptic phenomena compounded by Hyslop (cited by de Manacéine 1897, p.238) in regard to visual hallucinations in general and which includes: shadows formed on the retina by opaque bodies, movements of the blood corpuscles in the retinal capillaries, the entoptical pulse, pressure phosphenes, electric phenomena, spectra arising from internal causes such as increased blood pressure through retina (see also White and Levatin 1962; Horowitz 1978).

Ladd (1892, p.300) was convinced that there was no

shape known to him by perception or by fancy, whether of things on the earth or above the earth or on the waters, that had not been "schematically represented by the changing retinal images under the influence of intra-organic stimulation". Like a number of other eminent psychologists before and after him, Ladd took a great interest in the conditions of the "ideo-retinal light", "luminous dust" or *Eigenlicht* and its part played in the birth and formation of hypnagogic images.

As argued earlier by Cane (1889), the body produces a vast number of proprioceptive sensations ("intra-organic stimuli"), and in particular a great deal of light, which might act as causative factors in the creation of hypnagogic images. Indeed, Cane posited that "all the phenomena of dreams are fully accounted for by the auto-sensations physiologically developed within the body... sometimes increased...and modified by external impressions and stimuli". More specifically, he pointed out that

in a dark room with our eyes closed, we see that area of dim light called 'the proper field of the retina', and across which many see dim moving figures and shades of colour, which blend and dissolve fantastically. This field gets gradually brighter the longer we abstain from viewing actual light.

(Cane 1889, p.1331)

Müller (1826) referred to these brilliantly coloured images which he never failed to see at sleep onset "with closed eyes and in the darkness of the field of vision" (*ib.*, p.20), as being "nothing else than the luminous phantasms which appear in the visual substance, before going to sleep, when our eyes are closed" (*ib.*, p.49) and which originate in intra-organic stimulation, in particular through the changes in blood supply taking place in the eyes. Maury (1878, p.79) said that he was often able to establish "the passing-over of a luminous image, due apparently to the excitement of the optic nerve, into a clearly defined figure". Galton (1883, p.114) pointed out that one's field of view in the dark is by no means essentially black but that rather "a kaleidoscopic change of patterns and forms is continually going on". Ladd (1892,

p.300) talked of "a black mass or wall...with a great multitude of yellow spots dancing about its surface". James (1890, p.46) made a general principle of the Eigenlicht by noting that "any objective stimulus to be perceived must be strong enough to give a sensible increment of sensation over and above the ideo-retinal light". And, although "even in conditions of full daylight careful inspection will reveal luminous dust effects, an achromatic mottled atmospheric haze" (McKellar 1957, p.83), it is clear that the optimal conditions for observing ideo-retinal phenomena are those of darkness or twilight during which James' "increment" is "wholly or mostly absent" (ib., p.82).

Both Ladd (1892) and Ellis (1911) took this physiological phenomenon as the basis for the formation of dream and hypnagogic visual images. Ladd (1892, p.299) noted that Müller and Maury had both theorised "that 'the stuff' of certain dreams or the material made into many of their visual dream-images, originates in the scheme marked out in the 'retinal phantasms' by chance variations in the blood supply", and that their confidence in this hypothesis "was chiefly based upon their ability to follow the retinal phantasms up to, or into, the visual hallucinations of dream-life". All three agree that "any form of unusual cerebral excitement is conducive to very lively activity among the retinal phantasms" (ib., p.300). Whereas Müller and Maury drew their conclusions by observing "retinal phantasms" turning into hypnagogic images, Ladd set himself the task of observing the latter fading into the retinal Eigenlicht (ib., p.300). He was, thus, able to wake himself fully after a few minutes of dozing and catch the images just as they began to disappear. His introspections led him to conclude that "the visual 'stuff' of those dreams which occur soon after falling asleep is largely, if not wholly, due to excitement of the retina by intra-organic stimulation" (ib., p.301). He further explains that the intra-organic changes which take place all the time in the body acquire prominence due to the increased sensitiveness of the soul owing to the raised

threshold of consciousness as regards susceptibility to external stimuli. (cf. Aristotle 1931 on the causation of dreams, and Arnold-Forster 1921 and Ornitz et al 1967 on the sensitivity of hypnagogia).

In dreams and dream onset states, Ladd explains, "the superior psychophysical mechanism which combines, elaborates and interprets...data is, for the time being, partially freed from the laws which control its action in waking consciousness" (Ladd 1892, p.303) and thus one falls victim to the strange, irrational, rapidly shifting and intermingling of ideoretinal-born images (see also Cane 1889: the "intelligism is deprived of its full means to test their nature"). In addition, Ladd points out that there is "a marked change in the character of the muscular adjustment and movement of the eye on passing from dream consciousness to waking consciousness" (ib., p.304) and that this "change in muscular sensations and in the feeling of fixated attention...is necessary to the recognition of the schemata in the retinal field as the components of those fanciful things" with which one's "mind's eye" holds commerce in a dream or dreamlike state (ib., p.304).

In arguing for the ideo-retinal origin of hypnagogic visual imagery Delage (1903) distinguishes between objective and subjective retinal images. In the latter group he subsumes (a) chance images, (b) phosphenes and (c) entoptic lights. The first are after-images of physical objects; the second emerge as a result of pressing or rubbing one's eyeballs (immediate and consecutive phosphenes respectively) and consist of coloured figures, whirling and animated geometric "tapestry" patterns and coloured clouds; in the third he distinguishes between entoptic lights arising from near-morbid conditions (e.g., blood pressure changes, fever, ingestion of certain substances) and spontaneous ideoretinal phenomena. It is the latter he implicates in the emergence of hypnagogic visual images in normal subjects. Like Ladd, Delage (1903, 1920) observed hypnagogic images dissolving into spots and patches of colour. In addition, he contended that eye movements are involved in the observation of hypnagogic visual

images.

As Leaning (1925, p.388) pointed out in respect to visual hypnagogic imagery, all the 'perceptual' features present in hypnagogia, that is, brilliancy, rapidity of movement, colours, cloudiness, shapes, as well as the circularity of form, the impossibility of retaining a given combination of elements or repeating it exactly, the frequency of bright points, the incessant change in the pictures and the fact of the latter being sometimes observed as they form, and the indication that in respect to health "there is a common factor to a state of over-fatigue, of exhilaration, and of fever, in the velocity of the blood currents", all point to physiological explanations.

Central involvement:

Nonetheless, it is conceded by all researchers concerned with the issue that the whole gamut of quasi-perceptual phenomena occurring at sleep onset, even if we accept that some or all of them have their genesis in physiological sources, still they are the result of interpretation involving the participation of higher cerebral centres. Thus, "it is to occult processes which go on within the cerebrum", Ladd tells us, "that we must look for the physiological antecedent of the elaborated, associated, meaningful and memorable character of the visual shapes of our dreams" although "we neither see nor imagine aught without participation of the retinal changes in the complex psychophysical process" (op. cit., pp.301-2). Hence, "the most elaborate visual dreams may originate in intra-organic retinal excitement", and since

the variety of material in the shape of dots, dashes, splashes, lines, and angles which are furnished by the retinal Eigenlicht is infinite,...all manner of inanimate things, of animals, plants, and human beings, seen in dreams, may resolve themselves into the phantastic schemata of the retinal field, if we can only manage to surprise these schemata with an observing critical consciousness.

(Ladd 1892, p.302)



Conversely, we can choose and determine what we wish to see in the ideo-retinal dust since "idea and volition, with their correlated psycho-physical cerebral processes, can (and to a certain extent) determine the condition of the retinal field" (ib., p.303).

"The eye", Ellis concurs, "supplies entoptic glimmerings, and the brain, acting on the suggestions thus received, superposes mental pictures to those glimmerings" (Ellis 1911, p.31). Similarly, McKellar and Simpson (1954, p.274) concluded that "the outline of the images is provided by the luminous dust, but these are interpreted on the basis of such past perceptions as are activated" (see also McKellar 1957, p.81). Hicks (1924) too, had contended that

there can hardly be any question that such 'phosphenes' or 'ocular spectra' do supply the objective nucleus of visual imagery in certain dreams. And I know not why they should not likewise to some extent be operative even in the waking life. Indeed, one can in a state of reverie, by fixing attention upon these little objects in the field of vision, watch the way in which imagery clusters round them.

(Hicks 1924, p.142)

He went on to argue for "the probability that in imagination as in perception there is actually given sense-material, for the most part vaguely and confusedly apprehended, and often, no doubt, intra-organic in nature, which serves as the pivot around which the suggested 'imagery' is grouped and hence interpreted in objective fashion" (ib., p.144).

Warren (1921, p.455) wrote in connection with his (perseverative) hypnagogic images: "I wish to emphasize strongly...the fact that they appear unmistakably of retinal origin". More specifically, he said that he obtained these visualizations, as he called them, "by concentrating the attention on the retinal field, endeavouring to form pictures out of what I see, and projecting them into a real scene. At first I see only the play of indefinite retinal light, which I weave into a picture with the help of imagination. Then all at once the picture becomes vividly real for an instant" (Warren 1921; see also

Griffitts 1927). Delage (1903) considered hypnagogic visual imagery to be an accidental correlation of entoptic lights (which form "the substratum"), and cortical imaging. He says that "its precise representation of a given object is due to the cortical element, its strong externalization to the retinal element, and its intensity and relative position and stability to the joining of the two" (p.245)

However, oculo-retinal theories, even when they implicate the cortex in the production of hypnagogic visions, are not totally exempted from criticism. To begin with, if hypnagogic visions are indeed peripherally instigated the same must be shown to be the case with the rest of the hypnagogic imagery (auditory, tactile, etc: cf Alexander 1909). Moreover, Holt (1972) found no correlation between awareness of entoptic phenomena and the occurrence of hypnagogic imagery, although this piece of evidence does not necessarily argue against the possibility that in most instances, as Galton (1883), Ladd (1892) and Delage (1903) contended, hypnagogic images form themselves too quickly for the relaxing consciousness to be able to observe their formation.

Although some writers (e.g Gellé 1903; Janet: in Delage 1903; Leroy 1933) are willing to concede that some hypnagogic visions may form out of entoptic lights, others (e.g., Hervé de Saint-Denis 1867; Alexander 1909; Leaning 1925; Tournay 1941; Rouquès 1946) contend that they are essentially centrally initiated and that oculo-retinal participation is of secondary importance or even entirely unessential. As Alexander (1909, pp.629-630) put it: "there is no discoverable, nor indeed conceivable, relation between such [retinal] stimulation and the objects perceived. The images are neither perceptions nor illusions nor inchoate sensations; they are distinctly mental constructs,... [they] are externalizations, or, to use the word in its common-speech sense, materializations of mental facts; that is, they end rather than begin in sensation, acquiring a kind of phantasmal reality".

Leroy (1933, p.64) points out that hypnagogic visions

and entoptic lights may have nothing in common except for the fact that they tend to appear under the same conditions, i.e., a light state of cerebral congestion, eye fatigue, need for sleep, closing of the eyes. The nature of entoptic lights, he argues, is such that leaves them short of accounting for the appearance of hypnagogic visions. The latter, he further notes, may appear suddenly, complete, and yet not immediately recognizable, i.e., they are not formed by a play of imagination on entoptic spots. Further, they may develop into, or be replaced by, other images which are not visually related to them and thus reveal no entoptic links (pp.70-71).

Gellé (1903), Janet (in Delage 1903, pp.247-8), and Leroy (1933) all argue that ocular movements do not necessarily imply essential or active participation of the eyes in the perception of hypnagogic visions: they may simply appear in response to our natural habit of moving our eyes in pursuance of a moving object. Even the fact that they appear in front of us, Janet argues, might only be "because we are used to always seeing objects in the line of vision", i.e. in front of us, whereas hypnagogic visions can in fact be placed anywhere as they are not truly related to our optical space.

Some support for the above contentions comes from more recent arguments in respect to functional similarities of imaging and perceiving (e.g., Sheehan 1966; Hebb 1968; Zikmund 1972; Finke 1980). If Hebb is right in saying that an image is a reinstatement of the perceptual process then it would be reasonable to expect involvement of oculomotor movements in visual imaging, e.g., hypnagogic visions. As Zikmund (1972, p.379) points out, there is "a certain similarity between the physiological processes underlying visual perception and those occurring while sensory experience of vivid visual imagery takes place". Thus, "during vivid visual imagery complex visual and oculomotor components of visual perception mechanisms are reactivated". It would appear then that vivid visual images acting as centrifugal impulses from the brain may stimulate the oculo-retinal complex which, in turn, may involve the whole or part of the visual pathway through

movement feedback mechanisms.

In Finke's (1980, p.114) view, visual "mental images can be functionally equivalent to physical objects and events at many levels of the visual system, even those levels that are uninfluenced by how objects and events might be conceptualized". He further argues that the mental images themselves, once formed, cause the visual mechanisms to become activated. That is, "images are the source of this activation not the product of it" (p.130). He continues,

According to this view, mental images can stimulate visual processing mechanisms directly. Thus, when mental images are formed, these mechanisms would respond in much the same way as they do when objects and events are observed, resulting in the sensation that an image can be 'seen' as if it were an actual object or event.

(Finke 1980, p.130)

This view may explain both the findings of Brooks (1968) and Segal and Fusella (1970) which showed mental imaging interfering with visual perception and the fact stressed by various hypnagogists (e.g., Collard 1953) that deliberately formed visual mental images do not blend with ongoing hypnagogic visions: the former were presumably using the same level of the visual system for both perceiving and imaging whereas the latter was using different levels.

A source of evidence supporting the hypothesis that visual hypnagogic images are primarily centrally initiated and that their 'projection' may secondarily activate or involve peripheral receptors, e.g., the retina, are reports of the occurrence of after-images from hypnagogic-hypnopompic imagery, deliberate conscious visualizations, and experiments with hypnosis. Various writers (Gruithuisen 1812, p.256; Burdach 1839; Meyer 1840 and Strümpel 1874: cited by de Manacéine 1897; de Manacéine 1897; Alexander 1904) reported after-images from dreams and hypnopompic visions. Wundt (1863, p.337), Féré (1885), Meyer (referred to by James 1890, p.67), Binet (1894, reporting on the work of Ladd), Klüver (1928), Jaensch (1930), Weiskrantz (1950), Oswald (1957a, 1957b, 1959a) reported after images on

opening the eyes after intense visualization of a mental image with closed eyes. Similarly, mental visions suggested to subjects under hypnosis resulted in their experiencing after-images on opening their eyes (e.g., Binet and Féreé 1898; Downey 1901; Bechterev 1906; Erickson and Erickson 1938). In most hypnopompic cases the imagery experienced on opening the eyes is not different from that being experienced with the eyes closed, although it sometimes appears in complementary colours. The latter phenomenon is nearly always the case with voluntary visualizations and hypnotic cases. Weiskrantz (1950) found that with one subject the after-image of a visualization followed closely Emmert's Law (see also Alexander 1904). Concluding from the results of his own experiments and others, Oswald (1957a, p.98) says that after-images can occur as a purely central phenomenon, that there are spontaneous after-images in complementary colours of images or hallucinations, that the construction of a vivid image may involve many of the same neurones as are involved in the perception of a similar real stimulus, and that (Oswald 1957b, p.115), in addition to the above, on opening his eyes a subject may experience the original image projected with a quality of a real sensation.

Further support for a hypothesis of non-peripheral origin and formation of visual imagery comes from some old investigations carried out in regard to the dreams of the blind (e.g., Heermann 1838, Jastrow 1888, Hitschmann 1894: cited by de Manacéine 1897, pp.302-308) which showed that when loss of eyesight occurred after the age of seven the visual dreaming ability was often retained and when sight was only partially lost dream visions became distinctly more vivid than physically seen objects. In particular, Heermann noted that dream visions were still experienced after twenty years of blindness, by which time the patient's optic nerves must have had atrophied. More recently, Walter and Yeager (1956) found some evidence suggestive of retention of visual imagery if sight is lost in later life.

Also supporting the theory of "central initiation" of

visual imagery in general are the results of a number of experiments in direct electrical stimulation of the visual cortex (Penfield and Rasmussen 1950, p.10) and excitation of the brain by temporal electrodes (Knoll et al 1962) whereby flicker as well as various subjective experiences of geometric patterns are reported. The results of Knoll et al (1962) study, in which electrical stimulation was applied through electrodes attached to the forehead of subjects, suggest that "besides the retinal ganglion network, the visual (but not the temporal) cortex or the primary visual pathway participates in the pattern excitation phenomenon" (ib., p.67). By comparison, the direct electrical excitation of the temporal cortical 'memory' centres (Penfield and Rasmussen 1950, Penfield 1958) yielded more 'objective' phenomena, e.g., horses and other animals, and reminiscences. Although various studies reporting 'entoptic scintillation' patterns and bright dots produced by electrical stimulation and other means (see Knoll et al 1962 for historical review and comparisons) tend to ascribe these phenomena to stimulation of the retinal ganglion cells, more recent research (Ishibashi et al 1964) shows that even colours and simple geometric forms are found to originate in deep structures of the non-dominant temporal lobe during electrical stimulation.

#### The implication of subcortical structures:

However, although electrical stimulation of cortical areas has elicited visual imagery it does not necessarily follow that these areas are directly responsible for the occurrence of such phenomena. As Mahl et al (1964, p.361) pointed out, "electrical stimulation of the temporal lobe...induces a state of consciousness which makes it more probable that primary-process modes of functioning will prevail". Penfield (Penfield and Jasper, 1954) noted that the surgical removal of those cortical areas which yielded specific memories when electrically stimulated produced no detectable loss of memory. Horowitz et al (1968) are led to postulate that "possibly the posterior

areas of the hippocampal formation are relatively devoted to the regulation of image formation" (Horowitz 1978, p.275). Moreover, there is a considerable accumulation of evidence arguing that the destruction of the visual cortex does not lead to total blindness (e.g. Klüver 1941; ter Braak and Vliet 1963; Weiskrantz 1963; Humphrey and Weiskrantz 1967; Brindley et al 1969; Pasik et al 1969; ter Braak et al 1971; Schilder et al 1972; Poeppel et al 1973; Sanders et al 1974).

Klüver (1941), for instance, found that in monkeys whose striate cortex had been completely removed on both sides the animals could still respond positively to a single light, to the brighter of two lights, could respond differentially not only to situations involving a sudden appearance of light but also to lights which were continuously present, could discriminate perfectly stationary stimuli, could discriminate two equally large and equally bright stimuli. Similar results have been obtained by later researchers working both with animals and humans. Ter Braak et al (1971, p.141) found that certain ('passive') optokinetic movements "produced by the movement of the majority of contrasts in the visual field [are] still present after ablation of the visual cortex and even after total decortication". Sanders et al (1974) found that a field defect could localize visual stimuli with considerable accuracy and differentiate certain aspects of their orientation and spatial distribution even though the patient had no awareness of 'seeing' in his blind field.

Weiskrantz and his collaborators found that a patient with loss of the striate cortex in the right hemisphere of his brain had residual vision in the part of his eyes not served by the striate cortex: the patient had little trouble discriminating between lines of different orientations and between noughts and crosses, his visual acuity in the blind half field was very close to that in the normal field, and performed well in colour discrimination tests (Lewin 1975). In earlier experiments with Helen, a rhesus monkey whose striate cortex was surgically

removed on both sides, Weiskrantz found that the animal "could run around a field or a laboratory without bumping into objects. She could climb trees and she was able to see small objects only 2mm across scattered on the floor. In an experimental obstacle course, Helen could pick up 25 currants in less than a minute without knocking over or even touching any of the obstacles placed in her way" (Lewin 1975, p.54).

Such experiments have led to the formulation of the "two visual systems" hypothesis according to which 'focal' vision is subserved by the visual cortex and 'ambient' vision by the superior colliculus of the mid-brain (see Trevarthen 1968; Perenin and Jeannerod 1975; Lewin 1975). It would appear that in ambient vision one's visual space is subjective in the sense that everything is located in relation to one's body; it is also unconscious, as witnessed by the subjects' denial of 'seeing' a stimulus although they can locate it accurately. As Humphrey remarked in reference to Helen "in one sense she sees everything, and in another, nothing" (Lewin 1975, p.54). Of particular psychological interest are the introspective reports of cortically blind patients of the way they 'see' the various stimuli. For instance, when Weiskrantz and Warrington asked their patient to describe how he determined the difference in the pattern discrimination test — the test between noughts and crosses — he said he could tell the difference by the "'feeling' of something jagged, or something smooth" (Lewin 1975, p.55). This haptokinaesthetic "feeling" would further strengthen the hypothesis involving subcortical structures in vision, and particularly the superior colliculus since the latter is known to be especially concerned with the body's movement.

Another source of information lessening the importance of the visual cortex, this time in respect to hallucinations, comes from Schatzman's (1982) experiments with an unusual subject. Ruth, Schatzman's subject, would sit with eyes open in front of a television screen which displayed changing checkerboard patterns that elicited normal visual evoked response. Then, by producing an apparition of her



daughter and placing it in front of her — thus imaginally blocking the screen from her visual field — she would cause her visual evoked response to completely disappear. Electroretinographic recordings showed that her retinas responded normally to external stimuli from light while she was engaged in the production of the apparition. This would suggest that stimuli entering her eyes were blocked before they reached the visual cortex. In other experiments in which she caused her apparition to turn off or on a real or imaginal light, these imaginal activities did not show any effect on her visual evoked response. This, in turn, indicates that the presence and activities of the apparition had no direct effect on the visual cortex except for blocking stimuli reaching it. One is forced to conclude that Ruth's imaginal, and yet in a sense very real, activities must have involved the visual pathway lying between retina and visual cortex — and thus point strongly to the implication of the sub-cortical pathway to the superior colliculus and thalamus. Of interest to this discussion is also Ruth's explanation of how she produces her apparitions. She says: "I stop paying attention to everything around me. I decide whose apparitions I want to make. I remember what the person looks like,... And I produce the person" (Schatzman 1982, p.256).

In contrast to Ruth's deliberate visualizations, James (1975, p.77) describes the case of a blind man, "an exceptionally intelligent reporter [who] ...is entirely without internal visual imagery and cannot represent light or colours to himself" and who one day felt the presence of "a grey-bearded man dressed in a pepper and salt suit, squeezing himself under the crack of the door and moving across the floor of the room towards the sofa". James commented that this vision "with the feelings of reality and spatial outwardness directly attached to it" was "a fully objectified and exteriorized idea".

From the evidence presented I would argue that hypnagogic visions are basically 'central' phenomena correlated with subcortical activities. They may rise initially at

any level of the visual system, that is, they may be instigated at a retinal, cortical, or subcortical level but they are subcortical in nature. The retinal components, when present, are incidental: they do not develop any further in the absence of absorption and psychological withdrawal. On the other hand, visions initiated in the visual cortex will remain faint visualizations without absorption and psychological withdrawal — and they will become hypnagogic when these two features are strongly present. It has been shown in the foregoing that there is a form of physical sight entirely independent of the visual cortex. On the other hand, in the production of visions, the retina need not be involved at all. These observations together with the reports of hypnagogic subjects that they cannot mix their more vivid hallucination-like hypnagogic visions with ordinary memory images and visualizations, and the data from Schatzman's experiments with Ruth, argue that fully-formed hypnagogic visions (as opposed to ideoretinal lights and phosphenes) are neither retinal nor cortical in nature.

Added strength to my claim may come from arguments in respect to the nature of alpha rhythm. Golla (1948, p.107) argued that "just as the alpha rhythm would appear to be associated with an absence of sensory stimulation of the visual system, its presence may also be taken as evidence of an arrested or non-cooperative state of the neurones subserving the mental processes that is the basis of visual imagery" (see also Golla, Hutton, and Walter 1943). Other workers who have studied this problem in relation to sensory stimulation and state of attention include Jasper et al (1935), Bagchi (1937), Williams (1939), Mundy-Castle (1951), Short (1953), Short and Walter (1954), Walter and Yeager (1956).

In contrast to Golla's argument above, Oswald (1957b, p.113) found that "subjects could experience changing or static visual images without any blocking of the alpha rhythm providing that difficulty was not experienced in perceiving the images" (my underlining). Jasper (Penfield and Jasper 1954) also found that Einstein displayed a

fairly continuous alpha rhythm while engaged in complicated mathematical operations which, as we saw in the section on 'Creativity', involved a high degree of absorption in visuo-kinaesthetic imagery. Thus the suppression of alpha EEG appears to be related to the effort of visualizing rather than to the presence of visual imagery. Conscious, effortful visualization may indeed be initiated at the visual cortex and thus cause suppression of alpha. But as absorption sets in the role of the visual cortex diminishes and the imagery becomes intensified taking on a life of its own as it becomes increasingly dissociated from the cortex.

It will be recalled that in chapters 4, 11, and 13 reports were presented describing how concentration on a mental image would result in the latter becoming vivified and either leading to sleep or to the subject's becoming 'fascinated', absorbed, and kinaesthetically involved in the character of the image. These phenomena might be better understood if related to the activities of sub-cortical structures, functionally severed from retina and visual cortex which are primarily concerned with locating one's body in external space. This functional severance, or deafferentation, from retina and visual cortex might also explain the hallucinatory character of the phenomena of an advanced hypnagogic stage as well as the fact that in general hypnagogic visions are seen in sharp detail and yet possess depth and perspective.

It is true that if the superior colliculus is primarily concerned with ambient vision and if hypnagogic visions are to be correlated with the activities of this structure then the sharp detail of these visions has to be accounted for. This contradiction, however, is only apparent and due both to the fact that in ordinary wakeful vision the visual cortex receives signals from the retinas and especially the fovea, and to the fact that under these circumstances the superior colliculus, through evolution, has come to be deprived of most of the focal retinal information supplied to the visual cortex — most, but not all of it. In hypnagogia, in sleep dreams, and in states of

intense visual internal absorption the visual cortex becomes functionally disconnected from the rest of the visual system while the superior colliculus and other subcortical structures are especially activated. This need not necessarily imply that cortically blind persons would have more numerous and more vivid dreams and hypnagogic hallucinations (although hallucinations in the blind are not infrequent: see e.g. ter Braak et al 1971).

As noted above, the visual cortex may play a part in the instigation of at least some of these visions. This may be partly due to the fact that we naturally learn to rely mainly on the visual cortex which provides us with the greatest amount of our focal vision while subcortical structures are mainly relegated to the task of ambient vision. As recent research reveals, however, cortically blind animals, although at first behave as if they are totally blind, with training they come to see almost as well as before they lost their visual cortex. Furthermore, as ter Braak et al (1971, p.141) point out, "in the lower animals (birds, reptiles) ablation of the forebrain does not produce a state which we would call 'blindness', so that 'vision' in these animals must be achieved by the relatively more powerful subcortical structures". However, both evolutionary habit and histological connections may play their part in the instigation of visions. Moreover, hypnagogic visions are by definition and by experience state-bound, that is, they emerge in the presence of a particular psychophysical state. This state, I shall further argue, is strongly related to the activities of certain subcortical structures only one of which is the superior colliculus.

One other area of research that may be brought in at this point of the discussion is that encompassing theories of "paroptic vision", "eyeless sight" (Romain 1924), "eyeless vision" (Ivanov 1964) or "dermo-optic sense" (Novomeiskii 1965) developed to account for the phenomenon of 'seeing' by means of one's skin. In these phenomena, as with cortically blind subjects, visual perception is 'felt', colours are perceived as "smooth", "sticky", or

"rough" (Novomeiskii 1965). Romain (1924) argued that paroptic vision was circular, or even spherical, that is, one could see in all directions, it did not involve the eyes although there was an acquired "cerebro-visual attitude of accommodation", it involved nasal mucosa in the perception of colours, its colour perception was wider on the ultraviolet side, it possessed the same characters as clairvoyant vision. He ascribed this type of 'visual' phenomena to the presence of ocelli - rudimentary but complete visual organs comprising refracting body, ocellary retina and optic fibre - situated in the epidermis and grouping themselves into umbels or composite eyes controlled by a paroptic centre which was very likely situated extra-cerebrally.

Although I will refrain from discussing the details of these theories I would make a point of drawing attention to the fact that the experiences they seek to explain, although purportedly visual, are characteristically syn-aesthetic and kinaesthetic phenomena which, I shall argue, typically characterize the activities of subcortical structures. I have already referred to the superior colliculus being concerned with bodily movement. As a result of his studies in synaesthesia Schiller (1935, p.468) concluded that "perception is produced by sensations of different modalities, which often create intersensorial patterns". He noted that Werner distinguished between two types of sensory function. The first and most primitive, sensation, is "a vital event resembling an emotion, in which subjective state and object consciousness are not yet separated". The second, perception, is a more developed sensory function, it is "less emotive and shows a highly differentiated objectivity". There is an evolutionary ascent from sensation to perception, a "development of diffuse emotions into detailed perceptions, ascending from a syn-aesthetic stage to a stage of differentiated configurations which give the impression of a world containing constant objects" (pp.468-9).

Thus perceptions, which are a later evolutionary acquisition, characterize higher mammals, and especially

humans, they are localized on the cortex which is of recent evolutionary development, they are concerned with 'stabilizing' and 'objectifying' sensations. By contrast, the synaesthetic stage is evolutionally older and should be found in its strongest form in lower animals and thus in the activities of the old brain. That this is the case can be seen in Schiller's experiments with fish. He writes:

I myself have trained fish (*Phoxinus laevis*) to discriminate between a bright and a dark chamber. In the first series the fish had to choose the bright chamber, and in the second series the dark one. After the fish had learned to choose the right light, I let them choose between two unilluminated chambers containing different odours, one musk, the other indol. Musk gives a bright, indol a dark impression to humans. The fish which were trained to choose the bright light also chose the brighter-smelling musk; those which had learnt to choose the dark chamber also chose indol. Neither of the scent was preferred to the other before learning to discriminate between the lights.

(Schiller 1935, p.469)

In earlier experiments Schiller had established that in humans the "so-called 'light' odours give a brighter impression than the 'heavy' odours" (pp.466-7).

In hypnagogia, strong synaesthesias are not uncommon. For instance, Hollingworth (1911, p.101) describes the following hypnagogic experience during a concert:

The orchestra played Grieg's 'Wedding day at Hegstad'. In the last bar there were three finishing blasts with full orchestra. I had become very drowsy and these blasts seemed to me to be movements of some huge bug which came sailing from behind the wings, suddenly alighting on the stage, first on the two hind feet, then bringing down the middle pair, and finally the two front feet with the final blast.

(Hollingworth 1911, p.101)

Other examples involving tactile, pressure and heat sensations turning into visions are given throughout this paper (e.g. Silberer 1965; Vihvelin 1948). Commenting on his experiments with fish quoted above, Schiller states that in these phenomena "there is a transfer of training between different senses". In the case of Romain's (1924),

Ivanov's (1964) and Novemeiskii's (1965) subjects who were trained to 'see' with their skin I would paraphrase Schiller's comment and say that in such experiences there is a training of transfer between the senses, or perhaps even a re-learning of sensing through one nuclear sense out of which developed and differentiated sensations and perceptions. In hypnagogia, due mainly to the LEB, such transfers occur spontaneously. Moreover, the experiences are felt kinesthetically, thus strengthening both the view that hypnagogic imagery is correlated with activities of subcortical structures and pointing to the possibility that, evolutionally, a nuclear sense, primarily tactile in character, existed before distant receptors were developed. Ontogenetically, this may still be witnessed in the way infants presumably perceive the world inside and outside them. I shall return to this point in the next chapter. In the present chapter I have been mainly concerned with pointing out that although hypnagogic visions may be peripherally instigated and the eyes, visual pathway and visual cortex become involved or activated during visual hypnagogic experiences, these latter are subcortical in nature and beyond the active control of the visual cortex.

## CHAPTER 16

### CEREBRAL CORRELATES OF HYPNAGOGIC MENTATION:

In the previous chapter I argued that hypnagogic visions are related to activities of subcortical structures. In this chapter I shall pursue those arguments with additional data and, further, propose that hypnagogia as a whole is related to subcortical activities and that the latter constitute the physiological correlates of unconscious-paralogical processes revealed in this state.

Costello and McGregor (1957, p.794) have argued that "the higher processes have an inhibitory effect on the visual processes — the visual processes being released from this inhibition in the drowsy state". Davis et al (1936, p.33) remarked that "'floating' seems to involve a depression of cortical activity". Walter and Dovey (1944, p.63) noted that "electrical activity at about 6 c/s is associated with involvement of subcortical structures". Walter (1948, p.240) further points out that the 4-7 c/s theta rhythms recorded from the parieto-temporal regions and characteristic of hypnagogia "are definitely correlated with a subcortical disturbance and particularly with perturbation of the relations between the cortex and basal structures". Similarly, Adie (1926) and Lhermitte and Tournay (1927) related the occurrence of hypnagogic hallucinations to cortico-subcortical perturbations.

These observations are of especial importance to the present discussion since one of the major tenets of this paper has been the claim that the occurrence of hypnagogia is closely related to subcortical activities which have gained the upper hand, so to speak, in their synergetic relationship with the cortex, or, at times, have become totally dissociated from it resulting in what Bremer (1937) has called cortical deafferentation. The latter term is, of course, used from the viewpoint of cortical supremacy but there is enough evidence to argue



that the cortex is more dependent on subcortical structures than the other way round. For instance, besides the relationship of theta rhythms to subcortical structures, the alpha rhythms too appear to "represent bioelectric activity in cortical cell dendrites, paced or regulated by centres in the thalamus" (Morris 1976, p.238). Moreover, facilitation of slow rhythms and suppression or total abolition of cortical activity can be achieved through manipulation of subcortical structures. Gerebtzoff (1941: cited in Walter 1948) produced abolition of cortical rhythms by stimulating the striatum, and by destroying the latter he produced an excess of theta rhythm. Also, stimulation of the posterior nuclei of the hypothalamus produces fast rhythms in the cortex while destruction of this area abolishes normal potentials (see e.g., Obrador 1943). Both, the striate and the hypothalamic effects on the cortex seem to be mediated through the thalamus. Evidence argues that the intralaminar nuclei of the thalamus are concerned with the regulation of the electrical activity of the brain (e.g Dempsey and Morison 1942; Kennard and Nims 1942a, 1942b; Morison and Dempsey 1942; Kennard 1943; Adrian 1947; Jasper and Droogleever-Fortuyn 1947). Le Gros Clark (1932: quoted by Jasper, in Penfield and Jasper 1954, p.157) emphasized that the cortex, "from a developmental and functional point of view, is to be regarded as a dependency of the thalamus and not vice versa" and that "the thalamus is the anatomical equivalent of the very threshold of consciousness" (p.407). Walker (1938, p.277) concluded that the thalamus seems to be "the mediator to which all stimuli...congregate and become modified and distributed to subcortical and cortical centres... The thalamus thus holds the secret of much that goes on within the cerebral cortex".

Penfield and Jasper (1954, p.156, footnote) postulated a centrencephalic system which they defined as "that neurone system in the higher brain stem which can be shown to have equal functional relationship with the two hemispheres". They added that "cortical functions may be better understood in terms of their interrelationship

with subcortical structures". Jasper (in: Penfield and Jasper 1954, p.179) further notes that on the brain stem are found centres, controlling respiration, cardiovascular and gastrointestinal functions and the posture and the tone of the body as a whole. He refers to Magoun and Rhines' (1946) findings that the mesial bulbar reticular formation has powerful inhibitory effect on motor centres, spinal reflexes and cortically induced movements. Moruzzi and Magoun (1949) and Lindsley et al (1949) have also shown that the brain stem acts upwards as well upon the cerebral cortex.

Significantly, and in respect to my relating epileptic 'aura' phenomena to hypnagogia, Jasper remarks that

The appearance of focal cortical epileptiform discharges, either spikes, or sustained high-voltage rhythmic activity, does not prove that these discharges originate in the cortex. They may be evoked potentials or secondary epileptic activation of the cortex in response to intense bombardment over specific projection pathways from subcortical structures... Experimentally, we have observed such discharges in numerous cortical areas - frontal, sensorimotor, temporo-parietal, and occipital - in cats and monkeys following local electrical stimulation of specific nuclei in the thalamus... If the thalamic discharge is sufficiently prolonged and intense, a self-sustained cortical discharge develops which continues after the thalamic discharge has ceased.

(Jasper: in Penfield and Jasper 1954, pp.222-223)

He further adds that "the specific relationship between the bilateral wave-and-spike complex of petit mal epilepsy to brief lapses of consciousness, and its electrographic reproduction from the thalamic reticular system adds considerably to the weight of evidence which relates this system to states of consciousness" (p.224; see also: Penfield and Erickson 1941; Jasper and Droogleever-Fortuyn 1947; Cairns 1952).

Furthermore, Hunter and Jasper (1949) by implantation of stimulating electrodes within the mesial portion of the thalamus of cats and monkeys were able to produce not only the electrographic picture but also the clinical form

of both petit mal and grand mal epilepsy. "Discharges", Jasper (Penfield and Jasper 1954) concludes, "in widely separated cortical areas, frontal to occipital, and in homologous areas of the two hemispheres, can be thus triggered from a common pacemaker" (p.225, footnote). Additionally, motor seizures can be elicited by electrical stimulation of the globus pallidus, subthalamus, tegmentum, and portions of the bulbar reticular formation without involving the cortex. For instance:

From the subthalamus it is possible to elicit bilateral myoclonic movements... In animals these movements can be obtained after bilateral removal of the sensorimotor cortex and frontal lobes. Cortical circuits do not seem to be involved in their elaboration. They may be accompanied by changes in cortical electrical activity, but this seems to be secondary to their more direct downstream action upon lower motor centres.

(Jasper: in Penfield and Jasper, 1954, p.225)

On the other hand, Horowitz's (1978; see also Horowitz et al 1968) stimulation of the deep structures in the limbic system of epileptic patients has elicited experiences very similar to those reported in the hypnagogia of normal subjects. For instance, on stimulating the left posterior hippocampus of a patient, Horowitz (1978, p.267) reports that the subject "seemed to comprehend some of the meaning of the questions, but his verbal contents and tonal inflections resembled those found in aphasia, sleep-talking, or hypnagogic speech". One patient described his experiences with electrical stimulation as "trying to grab hold of my memory but can't" (p.272). The stimulations, Horowitz notes, tended to produce an altered state of consciousness in which lexical cognition was reduced and image formation was enhanced or disinhibited, and increased influence of primary process prevailed (pp.274 and 276). The contents of the experiences ranged from sparks, lights and geometric figures to complete scenes with animals and humans. Some of the latter constituted memories and others were condensed pictorializations of the patient's current ideas and motives. And yet others were images and

hallucinations probably "never actually seen in prior experience. Sometimes the self was seen in a way in which would not be possible by self-perception" (p.273). As in hypnagogia, many of these hallucinations were forgotten within minutes of their occurrence.

Drawing on his own findings and on those of MacLean and co-workers (e.g., Pribram and MacLean 1953; Cuenod, Casey, and MacLean 1965; MacLean 1966) Horowitz (1978, p.275) suggests that either "there are visual pathways to the posterior hippocampal gyrus or "this area is, in some way, involved in the regulation of image formation". In Douglas's (1967) review of the literature on the function of the hippocampus in man there is the suggestion that the hippocampus is concerned with the maintenance of the distinction between images arriving from actual perceptions and internal imagery. In view of Pribram and MacLean's (1953) findings that the cortex fires into the posterior hippocampal gyrus which in turn fires into the hippocampus, it might be conjectured that at sleep onset when general cortical activity is considerably reduced the cortico-hippocampal firing would also diminish. But, if at this time of diminution of cortical firing into the hippocampal gyrus a certain minimum arousal is maintained, or even deliberately initiated, in the brain stem, then the function of the hippocampus as a regulator of imagery may be severely upset. Internal imagery may be confused with external perception. A certain minimum degree of arousal without active thinking ('passive alertness') is, of course, what investigators and experiencers of hypnagogia indicate as one of the most important characters of the state.

Lhermitte (1925, 1932) and van Bogaert (1927) showed that lesions of the mesencephalic tegmentum produce hallucinatory phenomena, and so do lesions or electrical stimulation of the upper brain stem core (e.g., Olds and Milner 1954; Roberts 1958). Lhermitte and Tournay (1927), van Bogaert (1927, 1968), Lhermitte (1938), Lhermitte and Sigwalds (1941), Tournay (1941), Rouquès (1946), Ey (1957), and Reimer (1970) have related, and some of them identified,

hypnagogic hallucinations with peduncular hallucinosis in brain-stem perturbations. Lhermitte and Sigwald (1941, p.236) pointed out that hypnagogic experiences and peduncular hallucinosis are strongly related by dint of their connections with the sleep regulatory system located in the mesodiencephalic and peduncular region. They note that in mesencephalic disturbances "the subject abandons real life and descends into a world wherein are unfurled the whims of an imagination free from all restraint or support" (p.236). They also relate hypnagogic hallucinations and cataplexy, as components of narcolepsy, to the loss of mesencephalic tonus. The latter may further be implicated in the production of hypnagogic phenomena in Huntington's chorea where these phenomena have been observed to wax and wane with the illness (Guyon 1903).

My relating of schizophrenia to hypnagogia may also gain extra support here by the findings of various investigators indicating disturbances of the reticular system, thalamic nuclei, diencephalon and brain stem of patients. For instance, Hoskins' (1933, p.450) findings in respect to the urine volume of schizophrenics suggest either "disturbed function of the diencephalon or of the posterior lobe of the pituitary gland". Hoskins also found that "the patients as a group showed a characteristic hypometabolism" (p.451) — low blood pressure, slow pulse, reduced oxygen consumption. In respect to respiration, it is known that alveolar carbon dioxide increases with relaxation (e.g., Haldane and Priestly 1935), and most noticeably in the first two hours of sleep; further, low blood oxygen is also known to be one of the causes of hallucination (Horowitz 1978, p.248). Hoskins (1933) concluded that the metabolism of the resting but wakeful schizophrenic is strikingly similar to the normal person in sleep and that "perhaps the characterization of the psychosis as a dream state is worthy of more literal acceptance than had previously been supposed" (pp.454-5). Davison (1966, p.71) found "an excess of diencephalic and brain stem lesion both absolutely and relative to the hospital population" of fifty schizophrenic patients.

He also noted that "basal brain lesions induced a psychosis more quickly than hemisphere lesions" (p.73). Further, both Staehelin (1944: cited by Mayer-Gross et al 1969) and Labhardt (1963) propose that a disturbance of diencephalic and mesencephalic functions may be implicated in the onset of psychotic symptoms. Labhardt views the appearance of these symptoms as the result of extreme stress often threatening the continued existence of the personality. Similarly, Fish (1961) associates severe anxiety with marked over-activity of the reticular system which latter he considers to be the cause of schizophrenia — which is another way of saying that the individual is presented with a great quantity of internal and/or external stimuli resulting in a breakdown of the filter mechanism or in "jamming the circuits". Fish's claim seems to be supported by experimental evidence showing that amphetamine overdose in normal subjects produces a psychosis which is clinically indistinguishable from paranoid schizophrenia (e.g., Connell 1958) and in which "the subjective experience is nearly always felt to have a dream-like quality" (Mayer-Gross et al 1969, p.300). Significantly, and supporting my hypothesis that hypnagogic and related experiences are associated with subcortical activities, Bradley (1957) has produced evidence suggesting that in animals amphetamine stimulates activity in the reticular system below the midbrain level.

Indeed, the complexity, plasticity of structural organization, sophistication in modes of activity, and centrality of the brain stem core (see e.g., Amassian and de Vito 1954; Scheibel et al 1955; Brodal 1957; Eldred and Fujimori 1958; Scheibel and Scheibel 1958) have led the Scheibels (1962) to suggest that this subcortical structure may be implicated in the production of n.o.b. (non-object-bound:hallucinatory) phenomena in general. They point out that

virtually every sensory system projects large numbers of collaterals from its centripetal tract systems into this central neuropil field.. the individual reticular cell usually receives

impulses from a number of heterogenous afferent sources... Several avenues of evidence suggest that axonal extensions of reticular cells may extend as far peripherally as the receptors themselves, and as far cephalad as the cerebral cortex. Extensions have been traced into virtually every identifiable nuclear area within the central nervous system.

(Scheibel and Scheibel 1962, p.18)

The Scheibels (1962) further point to the studies of Granit (1955) and Hernández-Peón (1955) which have shown respectively that single retinal cells can be facilitated or inhibited by stimulation in the mesencephalic tegmental portion of the reticular formation, and that stimulation of midbrain tegmentum results in depression of auditory potential in the cochlear nucleus. Eldred and Fujimori (1958) found reticular feedbacks projecting to muscles. Scheibel and Scheibel (1962, p.23) report that "throughout the length of the brain stem, our Golgi preparations indicate intimate participation of reticular axons collaterals and terminals in all cranial nerve nuclei" and that probably all of the cortex receives projections from the anterior end of the brain stem reticular core. Scheibel and Scheibel (1962) summarizing the data on the brain stem core indicate that the latter's axonal elements are present in the following:

first, at most, if not all, sensory receptor areas; second, at all relays at successively 'higher levels' of integration and differentiation; third, at virtually all, if not all, cortical sites; and fourth, presumably at all intermediate and terminal spinal stations along effector pathways.

(Scheibel and Scheibel 1962, p.27)

Thus, the brain stem reticular core appears to be the only system that can be demonstrated to be involved anatomically and physiologically at each or all levels of neural activity (p.30).

The most anterior part of the brain stem core, the so-called nucleus reticularis thalami, sits athwart all diencephalocortical and cortico-diencephalic systems and receives collateral from both. A cell ensemble within this neuropil field projects multiple axon systems both rostrad and caudad,... The unique geographical position

of this nucleus, and what little is known of its axonal trajects, suggests that it may serve to control functions in a way similar to the screen grid in a vacuum tube.

(Scheibel and Scheibel 1962, p.26)

The control exerted by the brain stem on respiration, body-posture, spinal reflexes, and even cortically induced movements, may shed light on, among other things, some hypnagogically induced psi phenomena, such as OOBES. We saw in the chapter on "Psi" that some subjects learned to make use of both ordinary and cataplexic hypnagogic-hypnopompic states to achieve "exteriorizations". Fox (1962, pp.126-7) made specific mention of a "pull" he felt at the region of the medulla oblongata during the initial stages of his "projections". Muldoon (Muldoon and Carrington 1965) reports that conscious ecsomatoses may be preceded by the feeling of "a tremendous pressure being exerted in the back of the head, in the medulla oblongata region" (p.51). This pressure causes, or results in, a rhythmical shaking or pulsating of the body accompanied by a "pandemonium of bizarre sensations — floating, vibratory, zigzagging and head-pulling" followed by the hearing of "somewhat familiar and seemingly far-distant sounds" (p.51). Further, since it is known that (a) in medulla oblongata are to be found certain nerves that control respiration and that (b) the latter is critically involved in the production of both hypnagogic and psi experiences, this old brain structure may play an important role in the occurrence of both. Cairns (1952, p.127) pointed out that "disturbance of the medulla oblongata, as well as of the pons, can produce loss of consciousness... With this loss of consciousness there is equally some disturbance of breathing or circulation". Again, 'psychics', practitioners of the occult, mystics and meditators (see relevant chapters) speak of employing patterned breathing to achieve paranormal effects. In some of these cases, as with Swedenborg for instance, the "disturbance of breathing" instead of accompanying loss of consciousness may lead to an intensification of the latter during the state of hypnagogia.



The phenomena described by Muldoon occurring spontaneously in hypnagogia are preceded and accompanied by the sheer awareness that one exists but is unable to locate himself. As Muldoon put <sup>it</sup> in describing one such experience, "I was aware that I existed, but where I could not seem to understand. My memory would not tell me" (p.50). Later in life Muldoon learned to induce these phenomena followed by ecsomatoses by means of a deliberately produced hypnagogia. He connects these phenomena with epilepsy and reports the case of a woman who "became gifted with unusual clairvoyant powers about the same time when she became a victim of epilepsy" (p.104; see also Green 1968b, p.214).

The argument for the involvement of oldbrain structures suggested by the above may further be strengthened by reports that psychics tend to function better when they are "turned on" by their sitters (see Huson 1977, p.67 on Eusapia Palladino). Further, Garrett (1941, pp.52-53) notes that "in the telepathic experiment the senses of taste and smell were serving me as keen agents in knowing that a telepathic state was functioning" - smell being the most "visceral" of the senses, as Koestler (1978, p.284) rightly remarked, oldbrain structures being known as the 'visceral brain'. Warcollier (1948, p.61) remarks that "in its most primitive form telepathy may produce coenesthetic disturbances, that is, sensations arising within the vital organs, including sensations of a depressing type; it may give rise to fits of weeping, vague presentiments or premonitions, confusions or disorientations".

Supporting my relating hypnagogia to subcortical activities and to states of psi there are reports to the effect that "psi in animals has seemed more consistent than in humans" (Morris 1976, p.241) suggesting that in humans there may be interference by cognitive elaboration and distortion from higher centres in the brain (see also Tart 1977). Moreover, some of these results have been obtained from precorticate animals (e.g., Reik 1949). (For more detailed argumentation along these lines see J.R. Smythies, ed., 'Science and ESP', 1971, and in

particular Hardy's article on 'Biology and ESP').

In placing primary importance on subcortical structures in the production of hallucinatory phenomena I do not wish to ignore the fact that some of these phenomena can be elicited at the cortical level. However, even in these cases subcortical structures may still be directly or indirectly involved given the data on their wealth and structural organization. Cairns (1952, p.141) points out that "destruction of both frontal lobes can result in profound disturbance of will, reason and emotion". But he also notes that "destruction of the thalami can do the same thing and, in addition, may be followed by the most profound loss of memorizing or by loss of crude consciousness" (pp.141-2). It has been known for some time now that sleep and wakefulness are controlled by subcortical 'centres' and that consciousness can be disturbed by lesions at any level of the brain stem and thalamus. It is also known that, although they normally work in harness, there is a fair degree of independence between cortex and thalamus. It is this independence which is probably declared 'irrationally' by the thalamus and other subcortical structures during hypnagogia. It is not here claimed that complete independence is ever achieved, or that it is desirable, but that brain predominance becomes clearly subcortical.

#### Against hemispheric arguments:

Evidence for hemispheric lateralization (e.g., Sperry 1968; Sperry et al 1969; Bogen 1969a; Bogen 1969b; Bogen and Bogen 1969; Gazzaniga 1970; Galin and Ornstein 1972; Galin 1974) might appear to argue that the psychological features ascribed to hypnagogia, and to hallucinatory phenomena in general, are exactly those claimed to be correlated with right hemisphere (or nondominant brain side) activities. I have the following points to make against such claims. To begin with, such features as creativity, holistic approach (as opposed to sequential-linear), artistic activity (e.g., spatial, musical),

unconscious processes, are not clearly shown to be properties of the nondominant hemisphere as opposed to being related to subcortical structures. For instance, in experiments in respect to hemispheric lateralization Galin (1974, p.573) reported "relatively higher alpha amplitude (a measure of idling) over the right hemisphere during the verbal tasks, and relatively more alpha over the left hemisphere during the spatial tasks. In other words, the hemisphere expected to be less engaged in the task has more of the idling rhythm". This conclusion is hard to reconcile with data showing bilateral continuous alpha during intricate mathematical operations (Jasper: in Penfield and Jasper 1954). Workers in the hypnagogic area have often spoken of switching to an easier (visual) cognitive mode requiring the expenditure of less energy. This accords well with the general passive-receptive state of the organism at sleep onset. Are we to suppose that, on the whole, the nondominant hemisphere expends less energy than the dominant one? How can this be explained physiologically and evolutionally? By contrast, we know that such states of lessened expenditure of energy (trophotropic states) are brought on by the activities of subcortical structures controlling sleep and wakefulness.

The features ascribed to the nondominant hemisphere are clearly ontogenetically and phylogenetically older than those ascribed to the dominant one. Should there not be anatomical correlations showing the temporal development of these two sets of features, such as the existence of animals having a 'right' hemisphere only out of which a 'left' hemisphere grew through evolution? On the contrary, we speak of paleocortex and neocortex when we refer to brain anatomy in respect to evolution. Decor-ticate humans such as anencephalic and hydrocephalic monsters (Puech et al 1947; Nielsen and Sedgwick 1949) are known to display "pleasure, in a babyish way, when being sung to" (Cairns 1952, p.113). Clearly, here we do not have nondominant hemispheric appreciation of music. Further, as we saw above, cortically blind humans and

animals may respond accurately to visual stimuli and move about their environment like sighted beings. They would not have been able to do so if visuo-spatial appreciation were monopolised by the nondominant hemisphere.

By contrast, we know that in hypnagogia the brain is 'driven' by subcortical structures as witnessed by the predominating 7 cps rhythms emerging from these areas and not from any particular hemisphere. Certain spontaneous physiological phenomena appearing during hypnagogia such as decrease of respiration, dizziness, floating, myoclonic spasms are all controlled at the brain stem level. As we saw in the chapter on 'Creativity', in hypnagogia whole poems are composed, problems are solved and meaningful speech is heard, none of which could seriously be thought of as a hemispheric monopoly. Moreover as noted earlier, the upper brain stem has equal functional relationships with the two hemispheres (Penfield and Jasper 1954). The significance of subcortical structures in regard to the control they exert on the cortex and their relative independence has been discussed above. I would further argue that their geographical position and evolutionary 'seniority' render them the natural candidate for the 'primitive', 'regressive', holistic, intuitive, etc., features sometimes ascribed to the nondominant hemisphere. Further, their axonal connections with both cerebral hemispheres suggest that if hemisphere lateralization is a fact then this fact looks like a development out of an initial subcortical lateralization, a point that will be expanded in the next chapter. Furthermore, Serman's (1972, pp.194-5) likening of infants to the decerebrate cat lends more support to my hypothesis since the 'regressive' hypnagogic mentation has often been compared to that of the baby or child. Similarly, Cairns (1952, p.113) pointed out that growing babies pass through a state of consciousness which takes place without participation of the cerebral cortex. Walter and Dovey (1944) have also drawn attention to the fact that in childhood the 4-7 cps theta waves are predominant. Fischer (1975) has even called alpha states "decorticate" states. In

addition, Luria and Vinogradova (1959, p.90) showed that when "the subject was given the appropriate dose of chloral hydrate, and the cortex was put into an inhibitory state" (my underlining) he responded to words by sound association (as opposed to sense association) -- a punning phenomenon common in hypnagogia and in childhood.

It may, thus, be concluded that not only hypnagogic visions and quasi-perceptual experiences but also hypnagogic mentation are related to subcortical activities. In the following chapter I shall further expand on this theme making use of data and arguments relating to epilepsy and the functional dichotomy between paleocortex and neocortex (old and new brain). In doing this I shall also return to certain points made in earlier chapters both in regards to the nature of hypnagogia and in reference to the latter's relationship with meditation, mysticism, schizophrenia, and creativity.

## CHAPTER 17

### THE OLD VERSUS THE NEW BRAIN:

In respect to epilepsy, McLean (1964) writes:

From animal experimentation on limbic epilepsy (induced by electrical stimulation) it has become evident that seizure-discharges induced in the limbic lobe tend in their spread to be confined to the limbic system... Such experiments provide the most striking evidence available of a dichotomy of function (or what has been called a 'schizophysiology' of the limbic and neocortical systems). Patients with smouldering limbic epilepsy may manifest all the symptoms of schizophrenia: the schizophysiology in question is possibly relevant to the pathogenesis of this disease... From the standpoint of the patient lying on the couch, the schizophysiology under consideration is significant because it indicates that the lower mammalian brain is able to some degree to function independently, to make up its own mind. The primitive, crude screen provided by the limbic cortex might be imagined as portraying a confused picture of the inside and the outside world.

(McLean 1964, pp.10-11).

In the above quotation McLean makes a number of important remarks at least three of which are highly relevant to my current discussion. I shall point them out and devote the rest of this chapter to discussing them in relation to both the experiential features of hypnagogia and adjacent states and to my view regarding the brain correlates of hypnagogia expressed in the previous chapter. Indeed, I shall expand on the latter to include considerations as to the genesis and nature of consciousness and the feeling of certainty experienced in hypnagogia. In previous chapters I used the self-explicit term 'subcortical structures' to stand for all brain structures below the cortical level. Another term bearing the same meaning is that of 'oldbrain' which I shall be using both as a convenient term and because of its phylogenetic connotations: it is collectively older than the cerebral cortex which is a mammalian acquisition.

McLean's relevant remarks are: First, limbic epileptic discharges tend to confine themselves to the

limbic system; second the 'oldbrain' tends to confuse the inside and the outside world; third, there is a dichotomy of function between limbic and neocortical systems, the former being capable of functioning and 'deciding' to a certain degree independently of the neocortex.

In discussing McLean's first observation we must bear in mind that not all 'oldbrain' discharges confine themselves to the subcortical level. As we saw in the previous chapter, electrical stimulation of oldbrain areas may reflect clearly on various parts of the cortex accompanied by the occurrence of related subjective experiences. Indeed, McLean is careful to qualify his remark by saying that limbic discharges tend to be confined to the limbic system. However, in limbic epilepsy there is a spread of the discharge within the limbic system indicating that a number of emotional and cognitive states may result. This is supported by the results of experiments in electrical stimulation of various loci in the oldbrain of animals which show that there is a spilling over effect resulting in 'abnormalities' of experience and behaviour, e.g., aggressive behaviour may combine with sex or oral activity. (Interestingly, in a wider context and under normal circumstances babies and dogs are observed to have erections during feeding). Conversely, surgical ablations in which certain parts of the limbic lobe are excised lead to an abolition of fear and anger, inability to avoid painful situations, loss or perversion of instinctual feeding, mating, and parental habits (e.g., Miller et al 1960). It is possible that in those cases of epilepsy where fear precedes and/or accompanies the seizure, the experienced emotion of fear is a mere concomitant due to the excitation of a particular limbic area; it may be related to an instinctive cognition (at the level of the oldbrain) that the seizure may terminate the organism's life or incapacitate it in the event of having to defend itself against a predator during the fit. On the other hand, mystical experience may be the result of defunctionalization (akin to surgical ablation)

of certain parts of the oldbrain and stimulation of others (in addition to a suppression of the higher cortical centres).

As we saw in chapter 10 the meditator seeks to make away with emotions, desires, external and internal noise, and achieve maximum psychological withdrawal (stages 1-5 of meditation). Two of the first emotions to go are those of fear and anger: they are conquered partly by the physiological switch to the parasympathetic system and receptive mode, a process that leads to the near elimination of all characteristic sympathetic-adrenal features. Painful situations, likewise, are not avoided: they are ignored (e.g., pain from crosslegged positions is not avoided but simply ignored, attention being directed elsewhere). Also instincts are supplanted in meditation exercises: feeding and mating instincts are often denied 'normal' expression and are sought to be sublimated in ascetic abstinence. Interestingly, reports of mystical experiences are replete with expressions such as "divine marriage", "divine union", "becoming one with the Absolute", "becoming one with the Cosmos", "realizing the Cosmos within oneself", "expanding and embracing the World". It is not at all difficult to see how such expressions stand as symbols representing sublimated oldbrain instincts. It is tempting to argue that the mystic, unlike the ablated animal, has the choice of returning to the pre-mystical (pre-ablated) reality. However, the issue is debatable. The long and persistent meditation and other exercises practised by mystics are unlikely not to have created permanent 'conditions' in their nervous system. This 'physiological' argument is supported by the experiential reports of mystics who declare that their experiences carry with them a form of permanent mutation. An important symbol in mysticism is that of the ouroboros, the snake that bites its own tail, symbolizing the return to the unconscious (and perhaps to autosexuality). The return to the unconscious or the union with the Absolute suggests an abolition or weakening of boundaries that distinguish the internal from the



external (proprioceptive and exteroceptive sensations), the 'I' from the 'It' (loosening of ego boundaries).

These, as we saw earlier, are characteristic feature of hypnagogia. They are also to be found in epilepsy. As Sedman (1966, p.2) observed, "in any epileptic disturbance which leads to a change in the level of consciousness there will be a concomitant, indeed inseparable change in self awareness. In some patients this is accompanied by states of a sense of unreality either in the self and/or in the environment", i.e., by a sense of depersonalization and/or derealization - however, the obverse feelings of a strong sense of reality and awareness are experienced just as often. Sometimes epileptic experiences start with "a feeling of power and ability to control things, there is a sense of expectancy, I have a clearer head and a clearer understanding of everything" (Sedman 1966, p.3). They may "occur in an ecstatic setting in which epileptics see the heavens open, hear God speaking. Others feel transfigured, or even feel themselves God" (p.3). As one epileptic reported:

Everything appeared more vivid, as though they were in technicolour. I felt as though I was part of it... the experience was so lovely I didn't pay attention to anything else... I had so many visions, I can't pick out any one, every vision was replaced by another - like a continuous beautiful picture. I saw Saint Joseph and Our Lady... I seemed to be in it all the time, with them everything seemed placid... There was the sound of lovely music - so beautiful I couldn't describe it.

(Sedman 1966, pp.3-4)

Sedman (p.4) comments that "the mood is always elated but a sense of tranquility is the rule, together with a pantheistic experience of merging with the environment or the visual phenomena". Changes in body schema, which Sedman associates with states of depersonalization, are also often reported by epileptics.

In respect to his observation that the oldbrain tends to confuse the inside with the outside world, McLean (1961) further remarks that the clinical impression gained is

that these patients "show an exaggerated tendency to regard the external world as though it were part of themselves. In other words, internal feelings are blended with what is seen, heard or otherwise sensed in such a way that the outside world is experienced as though it were inside. In this respect there is a resemblance to children and primitive peoples" (quoted by Koestler 1978, pp.288-9). The suggestion of ontogenetic regression is quite clear. The characteristics of internalization and incorporability we observed in hypnagogia, and through it in hypnosis and meditation, are also present. An example quoted by Koestler (1978, p.289) of an epileptic girl who as a child walked into the sunlight and reported the experience of having "a funny taste in my mouth of the sun", shows not only internalization of the environment but also a crossing over or translation of one group of perceptual data into another, just as in hypnagogia auditory, kinesthetic, tactile and other sensations turn into visual images, and visual imagery often carries with it tactile kinesthetic and other sensations. This crossing over from one sense modality into another is another form of boundary dissolution: information input is one modality is shared by another. These phenomena which in mild forms are encountered in normal individuals in the waking state (Galton 1883) take on exaggerated forms in pathological states (e.g., Luria 1975) and in hypnagogia (e.g., Hollingworth 1911, Vihvelin 1948) where they are reported along with other, "aura-like", experiences (McKellar 1957, p.70).

McLean's observation that there is a dichotomy of function between the limbic system and the neocortex, may further strengthen the possibility of a switch to oldbrain predominance during hypnagogia and related states. As Koestler (1978, p.286) remarked, the oldbrain occupies a strategically central position for correlating internal sensations with perceptions from the outside world, and for initiating appropriate action

according to its own lights, i.e., it has its own mental processes: it emotes and thinks - though not in verbal concepts (ib., p.283). He quotes McLean who says that although the oldbrain may be too primitive to analyse language

yet it might have the capacity to participate in a non-verbal type of symbolism. This would have significant implications as far as symbolism affects the emotional life of the individual. One might imagine, for example, that though the visceral brain could never aspire to conceive of the colour red in terms of a three-letter word or as a specific wave-length of light, it could associate the colour symbolically with such diverse things as blood, fainting, fighting, flowers, etc., - correlations leading to phobias, obsessive-compulsive behaviour, etc. Lacking the help and control of the neocortex, its impressions would be discharged without modification into the hypothalamus and lower centres of affective behaviour. Considered in the light of Freudian psychology, the old brain would have many of the attributes of the unconscious id. One might argue, however, that the visceral brain is not at all unconscious (possibly not even in certain stages of sleep), but rather eludes the grasp of the intellect because its animalistic and primitive structure makes it impossible to communicate in verbal terms.

(McLean: quoted by Koestler 1978, p.287).

We have already seen that in hypnagogia mentation is 'paralogical'. In particular, it has been observed that the notion of similarity is often totally replaced by the notion of sameness both on the quasi-perceptual level of imagery and on the conceptual level. This is not a matter of mere weakening of consciousness - implying only a reduction of higher cerebral activity - but also a shift to oldbrain activity. An extreme shift of functioning to the oldbrain may lead to one or

the other (or even, in really extreme pathological cases, to both) of two polarized groups of activities: (a) destruction, and (b) preservation, or, to use Koestler's terms, self-assertive tendencies and integrative tendencies, which may be linked physiologically to the sympathetic and parasympathetic system respectively. In either case, however, when the shift is considerable the resulting logic is peculiar to the locus of excitation. For instance, in many epileptic limbic seizures the attack is known to be accompanied by fear or anger suggesting the excitation of a particular limbic locus correlated with these emotions; the "lost feeling" that usually accompanies this type of attack can only manifest itself as a form of realization that one is 'cut off', isolated, in danger of dissolving and losing one's identity, implying that identity (self-assertion) is all-important to the patient. On the other hand, the mystic's ecstatic feeling of being one with everything manifests integrative tendencies and points to a different limbic locus as the cerebral correlate of his experience of bliss. Interestingly, in respect to animals, McLean has localised drives and self-preservation instincts in the lower half of the limbic system and those tendencies and instincts concerned with the "preservation and welfare of the species" in the upper part (Koestler 1978, p.292). However, on the human level one must be careful not to be too literal in drawing parallels with the animal kingdom, as human emotions and cognitions have wider aspects than those of animals; bearing this qualification in mind the dichotomy between self-assertive and integrative (self-transcending) tendencies may be maintained.

In many pathological cases resulting from anxiety and emotional stress there may ensue a violent shift to the opposite (self-transcending) tendencies, i.e., one is forced to 'let go', causing in its turn a reaction towards the original mode activity: the final result being one of vacillation between the two extremes, first affirming and then negating a state of affairs. This kind of 'simultaneous' assertion-and-negation

is also characteristic of mystical literature (e.g., Suzuki 1974). In both cases the contradictions are resolved: in the latter case by 'seeing' that in a real sense (real to the subject) all terms contain their opposites (indeed, are their opposites), in the former case by creating what Koestler (1978) has called a "close system" in which nothing can be contradicted. This kind of logic in which everything can be related to everything else i.e., in which there are similarities among all points of reference, and ultimately everything is the same, is to be encountered in hypnagogia and its presence in this state may enable us, as already pointed out, to understand not only pathological and mystical mentation as analysed above but also the possible mental mechanics of creativity (see Part Two).

As argued, the logic of the oldbrain as it manifests itself in hypnagogia and adjacent states traverses and intersects a number of FsOR drawing them together and relating them in paralogical ways, that is, it assimilates and relates images and concepts where 'logical' rules would not allow such activities. For instance, if the different modalities were thought of as different FsOR then synesthetic phenomena, as they occur in hypnagogia and adjacent states, are clearly paralogical: there is clearly no logical connection between, for example, the beats of an orchestral piece and the feet of a giant insect lowering itself on a stage (Hollingworth 1911) or between a flower and an umbrella (Galton 1883). Also, autosymbolic phenomena in general are paralogical; and suggest, furthermore, how the oldbrain can work independently of higher cortical centres. In hypnagogia the links in the succession of images are sometimes tenuous and often impossible to trace 'logically'. Conceptually, too, the association between ideas becomes tenuous or even entirely 'irrelevant': as one thinks about something following a logical, orderly, series of associations, ideas entirely irrelevant 'pop in' which then change one's original chain of thoughts and lead to ideas or conclusions totally unconnected with the initial thought

or problem. Sometimes the solution or 'end' thought cuts itself free from the original one and appears to exist self-contained, for its own sake, the initial thought completely forgotten. On other occasions, the 'end' thought is strongly connected with the original one and presents itself as a solution, or a conclusion, or even as a major premise to the initial thought which is thus turned into a conclusion. More often than not, the intervening thoughts (and/or the initial thought) are lost and one is left with a solution that has no problem attached to it. This state of affairs is not at all uncommon in hypnagogia (e.g., Arnold-Forster 1921). Where the intervening thoughts are missing the subject may jump out of hypnagogia shouting "Eureka", full of the certainty of inspiration, sometimes, to spend long and arduous hours trying to fill in the missing logical steps. If and when the steps are discovered and are shown to be logically sound and valid the 'end' thought is then recognized as the result of inspiration. Not, infrequently, however, the half-remembered steps are shown to be invalid, i.e., they are 'irrelevant', and empirical research may show both the steps and the conclusion are invalidly carried out. And yet the person concerned may still remain with a feeling of certainty that something significant or even momentous was presented to him and that somehow a way could be found to justify his feeling of certainty.

It can be seen from the above that hypnagogia contains innumerable combinations of 'irrelevant' associations both imaginal and conceptual that may simply remain, on the one side, 'irrelevant', and on the other prove themselves highly relevant: their relevance is often a matter of our readiness and ability to fit them into a consistent FOR. This is not always possible, which means that we may always have mystics and lunatics in our midst, people who would not accept that their 'intervening' and 'end' thoughts are indeed irrelevant when these are not shown to be valid in our universe of discourse. This is not merely to say that the theoretical frameworks of such individuals are alien to, and outside, the possibilities

of what can be structured according to rules of logic, but more importantly, that their FsOR are derived from paralogical experiences, that is, experiences which carry with them their own logic and type of understanding.

As pointed out elsewhere in this discussion, to refer to hypnagogia as a strange state is simply to make a value judgement from a 'logically' operating waking state. But in the depths of hypnagogia itself no such judgement is possible: strange associations, and what would appear to be some kind of inductive and/or deductive activity do not seem at all strange while they are being carried out. It is possible that the hypnagogist the mystic, the 'psychic', and the 'mentally disturbed' person have entered into a state of mind that permits paralogical associations between a number of universes of discourse. These associations appear to them perfectly 'logical' and, as far as they are concerned, it is the rest of the population who are unable to see them. Van Dusen (1975, p.21), for instance, tells us that Swedenborg "felt it was possible to deal with universal ideas, understanding at once all the implications of a thing" by means of the method of "passive potency" (i.e., passive volition, as in hypnagogia). Plotinus (O'Brien 1975), before him, had practised a similar technique which he adapted from Plato's "Symposium". This method of inspiration which appears to circumvent or cut through logical steps, cuts both ways: it may lead to great and empirically verifiable inspirational insights, or to irrelevant gibberishness (although it might still be argued that calling such statements 'unverifiable' may simply mean that we are only capable or willing, to try and verify statements that render themselves verifiable according to our principles of verification).

Koestler (1978) suggests the concept of "bisociation" as an explanatory notion of the conceptual activity wherein two disparate FsOR ("matrices") such as the phases of the moon and the tides can be brought together. In fact, as noted earlier, in hypnagogia the subject is often faced with more than two intersecting "matrices" and

may thus be said to be 'multi-sociating'. In this activity the individual does not associate 'logically' but 'paralogically'. In the above well known example of Kepler's associating the phases of the moon with the tides, Galileo is said to have dismissed the idea as an "occult fancy". Similarly, in the case of hypnagogia we talk of the irrelevancies of imaginal and conceptual associations which, not infrequently, have been labelled 'occult', partly because of their apparent autonomy but also because of their paralogical nature: the hypnagogist often becomes overwhelmed by an 'understanding' which defies logic. A contributory factor to this 'understanding' is a diffuse feeling of a sense of significance, a feeling of certainty. This indescribable feeling which accompanies many of our everyday activities and is found to occupy a prominent position at the end of a logical transaction, is found in hypnagogia to accompany the unfolding of imagery. When it does not take a more defined form as the "accompanying sense of significance" in relation to specific imagery contents (see chapter 7), it is diffused throughout the imaginal experience and endows it with reality. This, I believe, is due again to the presence of 'fascination' which prevents the hypnagogist from 'contemplating' and allowing alternative possibilities to enter into the game. I have underlined 'alternative possibilities' because alternatives as such do not exist in this state. In hypnagogia there are no negations, there is no possibility of negation. Everything that appears carries with it the confirmation of its own existence. The associations in hypnagogia, too, are confirmations of their existence. It is as if every image shouts 'I am', and the hypnagogist does not hear this, he knows it. Thus, associations arising in hypnagogia are paralogical in more than one respect: (a) they do not always follow known rules of association (e.g., proximity, likeness, contrast), (b) they cut across FsOR linking them together in 'irrelevant' ways. It is thus not surprising that they may relate, as in McLean's example above, disparate things such as blood and flowers.



Hypnagogia also manifests, like the hypnotic and mystical states, the paradox of combining single-mindedness (non-reflection) and self-transcendence (non-self-assertiveness). We might get closer to understanding the paradox if we keep constantly in mind the hypnagogist's sensorial and conceptual 'openness', that is, his all-round sensitivity and suggestibility: the hypnagogic associations are not 'irrelevant' associations, because each one is fascinatedly attended to. Irrelevant data are such data as cannot be 'logically' related to a FOR, and in hypnagogia there is no single 'logically' constructed FOR. In the depths of hypnagogia the subject is peculiarly single-minded since every image, concept, or association 'fascinates' his attention. This state of total attention, we may remind ourselves, is similar to that reached by the meditator who sets out deliberately to concentrate his whole attention on a particular object, image, or concept. The hypnagogist's fascination which eliminates or prevents 'secondary consciousness' also eliminates his self-assertive tendencies. And here may, perhaps, lie an important clue to man's acquisition of self-consciousness: its genesis may lie in those instincts and needs generally related to the activities of the sympathetic-adrenal division and the emotions of hunger, fear, and anger.

It is often argued that the cerebral cortex is the "apparatus which generates awareness" and that (Koestler 1978, p.282) "the ancient structures in the brain-stem may be said to provide the 'raw material' of awareness: the the reticular formation 'arouses' the animal; the hypothalamic structures contribute the visceral component; but ultimately 'the cerebral cortex is to the brain what the television screen is to the television set and what a radar screen is to the pilot' (McLean 1958)". Interestingly, McLean, as noted above, localized self-preservation and species-preservation instincts in the lower and higher parts of the limbic system of animals respectively. These two groups of instincts are also linked respectively to the sympathetic and parasympathetic

divisions of the autonomic nervous system. In humans, Koestler (1978) has elaborated the first group into the "self-assertive tendencies" and the second into the "self-transcending or integrative tendencies". It will be noticed that there is a mutual implication between self-preservation and self-assertion: one asserts oneself in an effort to preserve oneself, and vice versa, he preserves himself in self-assertive efforts. The point to be made here is that the very notion of self-assertion (or self-preservation) implies the assumption that even at the primitive level of the oldbrain there is some form of self-awareness. Fear and anger may have arisen out of this need for self-preservation and this is, perhaps, why in an epileptic fit loss of identity and fear sometimes manifest simultaneously (thus also pointing to a localization within the limbic system of a strongly correlated physical discharge and the accompanying emotions). Thus, through the need to preserve itself as a more or less self-contained unit, an animal asserts itself on its environment: but without some form of awareness of itself as a separate unit self-assertion would be meaningless - and the support for this argument lies in the ability to feel fear and to be angry, which emotions, again, would be utterly meaningless and useless if they did not stem from some form of self-awareness (obviously, it is not to be argued here that all animal life emotes, at least not in an anthropomorphic sense, but that every time an animal attacks or withdraws from an attack it asserts itself at no matter what primitive level). This leads me to the formulation of the hypothesis that the oldbrain does not merely provide the "raw material" of awareness but also contains the locus 'responsible' for the genesis of self-awareness. The "schizophysiology" talked about by McLean and Koestler and argued as being the "insufficient co-ordination between archicortex and neocortex" (Koestler 1978, p.273), may in fact lie - in so far as there is such a state of affairs as "schizophysiology" - not so much in the lack of co-ordination between the two brains as between the self-assertive and self-transcending

tendencies generated in the oldbrain, and perhaps only emphasized and exaggerated by the neocortex.

The relevance of the above to the nature and function of hypnagogia lies in my description of the latter as a state characterized by integrative features and self-transcending tendencies, viz., LEB, abandonment, lack of fear of identity loss, the implicit assumption that the environment is not inimical, the tendency to incorporate (internalize) and merge with the environment, lack of fear and loss of self-awareness (or, perhaps, willingness to relinquish self-awareness) and, therefore, absence of self-assertiveness (the latter also due to the attentional features of hypnagogia, viz., absorption, fascination). This might enable us to (a) tentatively correlate psychological aspects of hypnagogia with the activities of physiological loci in the oldbrain, and (b) speculate as to its evolutionary genesis and significance.

If self-awareness, no matter how diffuse or intense, is closely related to the self-assertive instincts whose cerebral correlates - if McLean is correct - are localized in the lower limbic system, then we may speculate that self-awareness may also be correlated, at least in part, with the same or adjacent loci and, as I shall argue presently, with those activities of the reticular activating system responsible for wakefulness. Conversely, we would seek for the cerebral correlates of self-transcendence in the upper part of the limbic system, where McLean localized the "species-preservation" instincts, and in the thalamus (this contains the assumption that a human being transcends itself in species-preservation activities which are in fact only one type of manifestation or ramification of a human's self-transcending tendencies). Hypnagogia, characterized by the features enumerated above, is here considered 'integrative' and 'self-transcending'. The hypothesis that its correlative cerebral locus is to be found in the upper brain stem is inferred from the activities of the RAS and its reciprocal influence on, and by, other oldbrain structures.

As Magoun (1963b, p.174) noted, "it is now possible

to identify a thalamo-cortical mechanism for internal inhibition, capable of modifying activity of the brain partially or globally, so that its sensory, motor, and higher nervous functions become reduced and cease. The consequences of the action of this mechanism are the opposite of those of the ascending reticular activation system for internal excitation" (see also Magoun 1963a). That is, the reticular activating system mediates arousal and alertness whereas the diffuse thalamic system mediates depression of cortical excitability and sleep. The medial thalamic nucleus (intrinsic nuclei) is, in fact, that part of the brain that induces rhythmic spindling or alpha activity in the cortex which can be blocked by higher frequency electrical stimulation from the RAS. The fact that the thalamus also acts as a relay station directing afferent sensory signals to the cerebrum may have a great deal to do with the genesis of hypnagogia. In the upper brain stem the raphe system is thought to inhibit the RAS and yield quiet (NREM) sleep. Giant reticular neurons are, further, implicated in the production of PGO spikes and paradoxical (REM) sleep in the cat. (The subject of relating hypnagogia to sleep and dreams is dealt with in more detail in chapters 5 and 9; here I shall concern myself with 'localization' of awareness and self-awareness).

Thus, it is often argued (e.g., by James 1890; Oswald 1976; Koestler 1978) that not only is awareness dependent on cortical activation but that consciousness is cortical activity, and that without the contribution of the old "visceral" brain to provide us with internal bodily sensations "the experience of our own reality would probably be absent" (Koestler 1978, p.289), we should be, as McLean (1958) put it, "disembodied spirits".

Now, I believe these arguments to be wrong because of the criteria on which their premises are based. To begin with, these arguments appear to view consciousness as a behaviourist 'thing' entirely dependent on the criteria of arousal, i.e., a subject loses and gains consciousness (like one loses and finds a pencil) depending on his EEG

record and whether he opens his eyes or shows other signs of wakefulness or sleep, as the case may be. A considerable research has been carried out to demonstrate the existence of "collateral afferents" that branch off into the reticular formation from the main sensory pathways that carry signals, through relays, to the cortex. Attaching these findings to the above criteria of consciousness the conclusion is drawn that "when human consciousness is lost it is because of failure on the part of the reticular formation to send up a sufficiency of the non-specific or 'activating' nerve impulses to the cortex" (Oswald 1976, p.37); for instance, in animals that were given ether or the barbiturate drug thiopentone, electric shock to the leg resulted in a cortical evoked potential identical to that registered in the animals' normal state whereas "the evoked potential in the reticular formation of the anaesthetized animals was now very small" (*ib.*, p.38). In this example the cortex is clearly responsive (awake?) to stimuli during the time the animal is drugged while the reticular formation's responsiveness is greatly diminished, and is thus surmised by the experimenters that the animal was not conscious of the stimuli. But surely, if signals reaching the cortex do not cause the animal to respond this does not support the notion that consciousness 'resides' in the cortex; on the contrary, it rather suggests that the 'residence' of consciousness is to be sought for in the reticular formation. In other experiments (e.g., Kleitman 1967) decorticated animals continued to show variations of wakefulness. Moreover, these same decorticate animals manifested loss of learned habits demonstrating how learning is dependent on the cortex and, thus, how the cortex is responsible for the acquisition of relationships with the environment and, therefore, reversing McLean's argument that if the cortex were on its own it would yield "disembodied spirits": It would seem that it is the cortex that supplies the 'reality anchorage' or reality testing principle so often invoked as a criterion for distinguishing between wakefulness and dreams or hallucinations.

It is tempting to distinguish between 'cortical consciousness' and 'oldbrain consciousness' as indeed both McLean and Koestler do. But when such a distinction is drawn - and I myself clearly advocate a distinction - the criteria on which the distinction is made are of the utmost importance. My position is that the cortex is there to fill in the logical steps, so to speak, between the major premise and the conclusion which are provided by the oldbrain. As Penfield (1938, 1957) and Thompson (1951; also Thomson and Nielsen 1948) argued, the system essential to consciousness is not to be found in the cortex but in subcortical structures, and in particular "where the mesencephalon, subthalamus and thalamus meet". Thus, consciousness as such does not 'reside' in the cortex but in the oldbrain: it is the specificity of consciousness that the cortex is concerned with - it provides sequential temporal and spatial relationships, it particularizes and individualizes existence. Major premises, universal ideas, and generalizations in a sense stand outside logic: they are assumptions supplied by the "integrative" aspect of the oldbrain which also provides, in its "self-assertive" aspect (separation, differentiation), the means for developing the specific logic of deduction and induction. It is possible that these tendencies of the oldbrain, as they are taken up and particularized by the cortex, become not only mentally but also physically polarized into the two cerebral hemispheres. If this be the case, it would be of great interest to seek for physiological relationships between areas of the oldbrain and areas of one or the other of the cerebral hemispheres that show strong and consistent correlations with "self-transcending or integrative" tendencies, on the one hand, and "self-assertive" tendencies, on the other. A tentative hypothesis at this stage might argue for correlations (a) between the upper limbic system, right cerebral hemispheres, and integrative tendencies, and (b) between the lower limbic system, left cerebral hemisphere, and self-assertive tendencies.

That the notion of consciousness is generally

and wrongly based on behaviourist criteria and environmental 'reality anchorage' can be seen in the attributes of consciousness offered by Oswald (1976, p.37). These are: skilled response, the utilization of former experience, a subsequent statement of having been aware, and being now able to describe what passed. "Wakefulness", Oswald continues, "by contrast, is possible without a cortex. Consciousness and wakefulness are not synonymous". Although I do not intend to argue here against Oswald's distinction between these two concepts, especially since I have contended that a person may be asleep and yet conscious, I would like to draw attention to the fact that meditators intensify their internal experiences by (a) ceasing to think analytically (cortically) and (b) increasing reticular formation excitation through breathing exercises that create excessive carbon dioxide in the blood or a shortage of oxygen (see also van Dusen 1972, 1975, on Swedenborg), and that creative individuals, as we have seen, reduce cortical - especially, lexical - activity (e.g., Woodworth: "Often we have to get away from speech in order to think clearly": Koestler 1978, p.80) as a form of induction into the 'act of creation'. It is also interesting to note that orientation to a sudden fearful or angering stimulus is known to be immediately followed by a momentary decrease of respiration thus, again, bringing about an intensification of awareness (excitation of the reticular formation) through increase of carbon dioxide in the blood.

As argued earlier, concentration and absorption (fascination) on a mental image (whether in hypnagogia, psi, or in meditation) may lead to a dissociated state wherein numerous automatic acts may be carried out giving a semblance of behavioural wakefulness which is also accompanied by all or most of the physiological criteria of wakefulness, and yet the subject's consciousness may be mostly or completely withdrawn, (e.g., A. Huxley's case: Erickson 1969), 'miles away' as we might say. Absorbed attention, also, is known to decrease respiration and oxygen consumption and thus excite the reticular

formation and intensify awareness; in psi, meditation and in hypnagogia (a) attention is absorbed, (b) respiration decreases, (c) cortical activity decreases (as partially evidenced by EEG recording and verbal reports): in such cases we have reports of experiences that are said to be "more real than reality" (this is not to say that all meditational and all hypnagogic experiences are of this nature; this would depend on the stage, among other things).

It would thus appear that awareness and self-awareness have at least some very strong correlations with oldbrain activities and may, in this respect, throw some light on ontogenetic views of awareness that argue, for instance, that for the child "the universe is focussed on the self and the self is the universe" (Koestler 1978, p.191), a state of consciousness Piaget called "protoplasmic" or "symbiotic" (see also Schachtel's "Metamorphosis" 1959). This state of consciousness which is said to be encountered in meditation and psi is also met with at some stages of hypnagogia, and may further render explicable the intensity of awareness experienced by epileptics during limbic epileptic attacks. That is, if awareness (sheer, selfless awareness as might be experienced in a 'fascinated' state) and self-awareness (rooted in instinctive self-preservation) are 'localized', as I have been arguing, in the oldbrain, then the epileptics' intensification of awareness, or self-awareness, as well as their frequent 'clouding' of consciousness, might be explained as the excitation of particular areas of the reticular formation or medial thalamic nuclei (perhaps in combination with the excitation of some other areas of the oldbrain, e.g., the increased spiking of the giant reticular neurons that course from the pons to the thalamus and precede PGO spiking and REMs in sleep). The reports of dreamy mental states or auras also preceding the seizures suggest that some medial thalamic activity is present that perhaps 'causes' a lowering of EEG (decrease of cortical activity). But decrease in cortical activity does not necessarily mean decrease in awareness.



If (a) the medial thalamic nuclei, somehow, 'dampen' the cortex and yet continue to receive sensory information which does not reach the cortex, or reaches it diffusedly, and (b) because of the dampening of the cortex the extrinsic association nuclei never manage properly to convey information to the association areas of the cortex, we may then have a situation in which (1) cortical activity is reduced (which might be taken to mean, *inter alia*, a quantitative reduction in logical thought processes), (2) exteroceptive and proprioceptive information reaches and crowds the thalamus but does not reach the cortex and is thus never processed 'logically' (this might explain the synaesthetic and paralogical nature of hypnagogic experiences). Since the medial thalamic nuclei form part of the limbic system we may thus 'localize' in this area Koestler's "self-transcending" tendencies and McLean's "species-preserving" instincts and thus also point to a physiological locus whose activities might be correlated with the psychological features of hypnagogia and related states.

In addition, it is possible that if the extrinsic association nuclei of the thalamus are prevented from, or hindered in, conveying concerted information to the relevant association areas of the cortex, including the memory areas, some of the results might be experiences not only of synaesthesias but also of their opposites, agnosias, as well as cryptomnesias, and *déjà vu* and its opposite *jamais vu*. The feeling of loss of identity, too, may have its physiological genesis in this area of the old-brain if, as argued, information from the senses is not conveyed from the thalamus to the cortex thus depriving the individual from his 'reality anchorage' and the preservation of his 'ego schema' that normally enables him to relate himself to his mental and physical environment: to reiterate a point made earlier, in order to retain - indeed, to acquire - ego schema and reality anchorage, information must be relayed to the cortex where the senses are so minutely represented, indicating how the logic of 3D reality is 'localized' on the cortex.

Déjà vu and the feeling of certainty:

The déjà vu phenomenon and hypnagogic experiences may both be correlated with activities of the same or adjacent oldbrain loci if the déjà vu is seen as a phenomenon in which the feeling of familiarity is derived from past experiences of similarity of perceptual or imaginal organizing activity but in which certain crucial 'anchoring' elements are missing, viz., the links with the appropriate cortical association areas. Thus, in the déjà vu we may have an experience in which not all the necessary perceptual-conceptual and imaginal connections have been effected, and in which the notion of similarity becomes identified with that of sameness, as is often the case in hypnagogia, that is, the experience is the result of oldbrain activation and cortical inhibition: the latter prevents the carrying out of detailed analysis and comparison between the relevant perceptual and conceptual data in the cortex, whereas the former intensifies imaginal activity in the oldbrain thus drawing attention to features (both perceptual and conceptual) which, though insufficient to enable the inhibited cortex to draw logical conclusions, are enough for the activated oldbrain 'logic' to decide that the present situation 'is the same as' another which may, in fact, have never taken place (or which there is no way of showing that it has ever taken place). This character of 'jumping to conclusions', not bothering with the missing links or intervening steps, is typical, as we saw, of the oldbrain paralogical mentation. The feelings of strangeness-yet-familiarity and certainty are shared by both the déjà vu and hypnagogia. Referring to the former, Crichton-Browne (1895, p.1) writes: "Those who are visited by it know well that it is no ordinary reminiscence, no error of memory, no mere poetical fancy, but an absolute identification of the present with the past". The experience is further characterized "by vagueness as to present surroundings, and an increase of consciousness in another direction", (ib., p.2) both, we may note, features of hypnagogia. In

the "absolute identification of the present with the past" we may also have a very similar attentional state to that encountered in hypnagogia and which, as noted, invests the latter with a feeling of temporal and spatial immediacy. Crichton-Browne further remarks that in dreamy mental states in general

[there is] a negative element in the loss of control of the higher centres and a positive element in the raised activity of other nervous arrangements, permitting of new cerebral combinations somewhat akin to those which take place during the activity of the imagination and flight of genius. .... A dreamy state it may be conveniently called, and dreamy in some aspects it undoubtedly is, and yet, strictly speaking, it is not comparable to a dream, for it involves a residuum of object consciousness larger than a dream contains and a volume of subject consciousness to which a dream rarely reaches. It has peculiar features of its own and stands in the same relation to a dream that the darkness of an eclipse does to the more frequently occurring darkness of night.

(Crichton-Browne 1895, p.2)

The relationship between dreamy mental states (and, in particular, hypnagogia), activities of imagination, and creativity have been discussed in chapter 13. Of immediate relevance are Crichton-Browne's remarks that in a dreamy state there is (a) "loss of control of the higher centres", (b) "raised activity of other nervous arrangements", and the implications of his argument in respect to (c) the resultant "new cerebral combinations". The first remark although acceptable in its general form it is debatable in its negative formulation. It is of functional and evolutionary importance to decide whether the lowering of cortical activity is to be considered a "loss" or an organismic reorientation and whether the cortex 'allows' the oldbrain to come into its own or the latter 'forces' the cortex into relative inactivity due perhaps to a circadian need. Although the whole subject of the function and evolutionary significance of hypnagogia is discussed in chapter 19, it would be relevant to quote here Isakower (1938, p.345) who, from a psychoanalytic angle, argued that "it is the repressed instinctual wishes, charged as

they are with id-libido, which occasion the [hypnagogic] phenomenon, with Cs [i.e., cathexis] quality". Leaving out a possible argument against the notion of "repression", the remark clearly argues that hypnagogia is not the result of loss of cortical activity but of oldbrain desires and instincts, that is, increased oldbrain activity appears to 'force' cortical activity into a decrease. Support for this argument also comes from the Hodes et al (1952) studies in which it was found that changes in the EEG activity of drowsing monkeys appeared in sub-cortical structures, e.g., the caudate nucleus, earlier than in the cortex. Crichton-Browne's second remark may be translated in our present terms into the raised activity of the oldbrain and the switch to the parasympathetic system. The third point is debatable only in the fact of placing stress on the "new cerebral combinations" as being in any major way responsible for creative activity. The position held in this paper (and argued throughout) is that in hypnagogia and adjacent states there is a switch to oldbrain activity, and whatever new combinations arise in the cerebrum or elsewhere during these periods are interpreted by the oldbrain in oldbrain 'logic'.

The existence of a strong relationship between the *déjà vu* experience and hypnagogia was argued by Ellis (1897) who also linked the two with "the prodromal stage of the epileptic fit" and sleep-dream consciousness (pp.285-6). Ellis considered these kinds of phenomena as taking place "in the presence of an enfeebled and impaired state of consciousness". He suggested that "it seems as if externally excited sensations in such cases are received by the exhausted cerebral centres in so blurred a form that an illusion takes place and that they are mistaken for internally excited sensations, for memories" (p.286). He further considered hypnagogia and the *inter-dormitum* as one and the same enfeebled state of consciousness wherein paramnesic experiences are liable to take place. The latter are experiences in which the "subject has an overwhelming conviction that even the minute details of the present experience have been experienced before"

(pp.284-5), that is, they are of the *déjà vu* character, or they may consist of the false realization that they have been experienced in real life in the past whilst in fact they have only been experienced in a dream, i.e., they are dream experiences that appear as memories of real events. Ellis concluded that "the hypnagogic state with its heightened liability to autosuggestion is really allied to the paramnesic state" and that "just as in the hypnagogic paramnesia the vivid and life-like dream or internal impression is raised to the class of memories and becomes the shadow of a real experience, so in waking paramnesia [i.e., *déjà vu*] the external impression is lowered to the same class" (ib., p.287).

Now, it has been one of my main arguments that in hypnagogia external input becomes blurred and internalized, and in this respect I am in agreement with Ellis; the blurring, however, is not necessarily the result of "exhausted cerebral centres", although under such conditions similar events are reported. As argued above, this is probably more of a case of shift in organismic orientation involving oldbrain activation and cortical inhibition. The cerebral centres Ellis refers to are not necessarily exhausted but merely (a) inhibited, (b) whatever information slips through to them is insufficient for the carrying out of sound and valid logical activities, (c) in their inhibited state they are probably also 'rearranged', i.e., their pattern of neuronal activity is not that of wakefulness. In addition, in the *déjà vu* experience and in most of hypnagogia there is a feeling of conviction and certainty in respect to the experience and, as Ellis himself notes, "there may be a subjective sensation of increased power" (ib., p.287; see also Sedman 1966, p.3), all of which suggest a positive interpretation in terms of increased oldbrain activity as opposed to a negative interpretation stressing cortical enfeeblement. As argued earlier, if the cortex 'houses' the ability to analyse and objectify temporally and spatially, it is by this very ability incapable of certainty and conviction, but only of deliberation and the thinking

of alternatives. In hypnagogia (and déjà vu) there are no alternatives: all possibilities appear as actualities. As Sartre (1978, p.44) observed in contrasting the act of wakeful perception to that of hypnagogia, in the latter "the appearance of the face and the certitude that it is a face occur together". This type of mentation is more in line with the expression of oldbrain instincts which have no alternatives, and emotions which invest logical conclusions (indeed, any kind of conclusion) with the feeling of conviction.

It might also be relevant here to consider in brief how certainty and conviction are only relative concepts in terms of cortical thinking and how, when they are, or become, strong, they are not amenable to modification no matter how common-sense, logical, or necessary these modification clearly are, thus indicating that the stronger the certainty and conviction the less they are related to cortical activity and the more they take on the character of instinct, i.e., oldbrain activity. And, though conviction is a feeling we all experience to a greater or lesser degree in our daily lives, it is only in states of oldbrain predominance such as in hypnagogia and adjacent states (sleep-dreams, déjà vu, mysticism, schizophrenia) that its strength is of such a degree (i.e., oldbrain activity is so strong) that it cannot be wavered by alternatives (i.e., by cortical argumentation). Beliefs, especially strong beliefs which are indistinguishable from claims to knowledge, are characterized by conviction and may thus be said to be firmly rooted in the oldbrain. As Koestler (1978, p.289) put it, "irrational beliefs are anchored in emotion; they are felt to be true. Believing has been described as 'knowing with one's viscera'. More correctly we should say that it is a type of knowing which is dominated by the influence of the inarticulate oldbrain". All strong beliefs are irrational in the sense that they are beyond argumentation. A paranoid schizophrenic or a mystic cannot allow an invalidation of their system of belief: their belief is knowledge. In a similar manner the hypnagogic experience

and the déjà vu carry their own convictions. They may not always be anchored in strong emotions, but conviction is a feeling and as such it is rooted in the oldbrain.

The feeling of certainty in hypnagogia has been noted by various investigators. Poe (1949, p.543), for instance, spoke of it as "a conviction which seems a portion of the ecstasy itself". Van Dusen (1972), and Hollingworth (1911) made reference to it. We have seen it spread throughout hypnagogia, sometimes taking on a more obvious form as an accompanying awareness of significance. In preceding arguments I suggested relationships between the hypnagogic, psychotic, and creative thinking in various respects and in particular in the paralogical manner in which associations are made and in the often unjustified logical jumps that occur. These, as a whole, take place in a climate of certainty and conviction and may or may not survive the tests of waking logic.

## CHAPTER 18

### THE LOOSENING OF EGO BOUNDARIES:

In the preceding three chapters it was argued that hypnagogic experiences are related to activities of sub-cortical structures. It was further proposed, both as a corollary of, and as supporting evidence for, this argument that infants and children are primarily oldbrain creatures. These arguments accord well with ontogenetic theories of maturation and development which argue for infantile and childhood psychological characteristics that are identical to those displayed in hypnagogia.

Throughout this paper both actual descriptions of hypnagogic experiences as well as theories built round them and others presented for the purpose of illuminating the nature of these phenomena, have stressed the regressive character of hypnagogia. Hypnagogic mentation has been variously called autistic (McKellar 1957), dereistic (Oswald 1962), egocentric (Froeschels 1946); attention has been drawn to its nonrational or paralogical mode of cognition exemplified in the multisociation and fusion of remotely related or apparently entirely unrelated concepts and FsOR, which, it has been argued, is one aspect of the core phenomenon of the LEB, other aspects of which include body schema alterations, body schema dissolution, blurring of the distinctions between environment and ego. These latter features have been especially pointed out in the chapter on 'Hypnosis'.

The presentation and analysis of the events and phenomena of hypnagogia point to the presence of the LEB at the very inception of the state and render the latter's character and relationship with other states more explicable. Its presence has already been invoked in discussing the relationship of schizophrenia and creativity to hypnagogia. It can further be seen to be present in meditation and psi activities in both of which regression and childlike or infantile mentation have been pointed out as key features.



Depth psychologists and developmental theorists alike point to the infant's lack of ego boundaries, to the baby's being one with his mother's breast and his environment in general and only gradually, in tandem with his physiological growth, does he begin to differentiate himself from other objects and one object from another. Moreover, as Campbell (1957) argued, the infant probably cannot tell that he, as a separate entity, perceives but rather that there is simply 'perception' and that he has to gradually learn to associate impressions with personal reactions to realize that he is dealing with his own perceptions. In other words, the infant's perceptual system and ego sense have not yet grown to the point of giving birth to the sense of being a separate entity. It is even possible that at a very early stage in the infant's life there is no distinction between perceptual modes, or that there is a profound form of synaesthesia in which the core sense, so to speak, is kinaesthesia. As McKellar (1972, p.50) remarks "the adult has built up conventions about the sensory information he recognizes as visual, auditory, tactile, etc. At an earlier stage of development the child may not have established these conventions about the various sensory channels". We have already seen how synaesthesia is operant in precerebrate organisms (Schiller 1935). Bower (1977, p.63) proposed that "our perceptual system operates with distinctive features rather than sense-specific items". Wheeler and Cutsforth (1922, p.384) concluded that "kinaesthesia is an essential component of the consciousness of meaning". At the infant stage a fused synaesthetic mode may naturally be present and expressed in kinaesthetic activity as the infant relates to an, as yet, undifferentiated universe. Also, the infant's attitude in general is trophotropic as opposed to ergotropic, concerned more with intake than outward expenditure of energy.

Relevant to these observations is Collier's (1964) three-level theory of consciousness according to which the first level is "the simple, generalised contact-chemical-sense-feeling...seen as the phylogenetic basis for all

later developments of consciousness", the second level "appears phylogenetically when sense modalities become differentiated", the third level is characterized by "the evolved capacity to become aware of the fact that one is aware or conscious", that is, by "reflective consciousness".

Similarly, investigators in the hypnagogic area point out time and again that the initiation of the state is strongly linked with the absence of directed, analytical (cortical) thinking and that the emergence, intensification and prolongation of hypnagogic imagery is connected with a passive-receptive attitude and a feeling of abandonment, of loosening of ego controls. Van Dusen (1972, p.99), for example, spoke of hypnagogia in general as "the antithesis of ego". The hypnagogist's general feeling of 'chemical' (perhaps, one should say 'field') connection with his imagery and his tendency to internalize and subjectify his environment can be seen as parallels of the infant's trophotropic attitude; the physiological presence of the latter in hypnagogia has been pointed out in an earlier chapter.

Thus, my relating of hypnagogia both to the activities of subcortical structures and to ontogenetically earlier mentation (i.e., infantile, regressive) renders the presence of the phenomenon of LEB in hypnagogia not only plausible but necessary. Not only its presence might explain the occurrence of diverse phenomena in hypnagogia and related states but its nature is theoretically and experientially wide enough to subsume under it, or contain within it, other theories formulated to account for the same and similar phenomena. Thus, Deikman's receptive mode, McKellar's autism, Oswald's dereism, Piaget's and Froeschel's egocentricism, Koestler's bi-sociationism, von Domarus's paralogical phenomena, Freud's unconscious and preconscious mentation, Sidis's and Warcollier's subconscious, Prince's co-conscious phenomena, may all fully or partly be explained by the presence of LEB.

In order to understand the nature and conceptual

breadth and potency of the LEB we have to begin by examining basic assumptions about consciousness. To begin, I shall dismiss the notion that consciousness is equivalent to conscious awareness. As noted, such notion has given rise to expressions of 'losing' and 'gaining' consciousness as if the latter were an object to lose and find. Since Descartes' (1976, p.266) assertion that "the human soul is always conscious in any circumstances — even in the mother's womb", implying that so long as there is a mind this mind must exist in a variety of states of consciousness none of which could be thought of as constituting 'total unconsciousness', psychological research has strongly supported his claim. Sleep research and research in hypnosis have shown that the mind never really 'sleeps'. Moreover, experiments have shown that when the mind is asleep or unconscious another 'portion' of it may be awake and conscious, and that two or more levels of consciousness or 'portions' thereof can exist concurrently (e.g., Prince 1898, 1906, 1907, 1917, 1922, 1929; Sidis 1912; van Eeden 1969; see McKellar 1979b for a most recent discussion on co-conscious phenomena). Further evidence also comes from reports of near-death experiences and the experiences of clinically 'dead' people (e.g., Moody 1976). These data show that even at moments of behavioural and physiological 'total unconsciousness' mental activity can still carry on.

In maturation, along with the growth and dominance of the cortex there is a parallel development of ego sense. This is to be expected, since possibly the greatest achievement of cortical development is the acquisition of the ability to discriminate. But in order to discriminate barriers must be erected, restrictions imposed, boundaries drawn. And the first boundaries to be traced must be those relating to a differentiation between ego and environment beginning with recognition of sensation as something happening to oneself before these sensations are located and differentiated. As discrimination becomes sharper and attention focal, and ego boundaries tighter and better defined, information processing changes from global,

multi-directional to linear: 'filters' are formed to screen from focal attention 'unwanted' information. The defining of ego boundaries may be thought of as such a filter.

In filter theories, both when these are dealing with normal (e.g., Broadbent 1958) and abnormal psychology (e.g., Payne, Matussek, and George 1959; Cromwell 1968; Frith 1979) it is generally assumed that ordinary consciousness is characterized by small capacity, intolerance of ambiguity, and serial processing (Frith 1979). It is also often assumed that the conscious as opposed to pre-conscious processing is flexible and that the latter is mostly automatic (e.g., Turvey 1974; Erdelyi 1974; Eysenck and Frith 1977). However, this latter assumption clashes with data from other sources which show that it is ordinary waking consciousness, if anything, which is automatic (e.g., Deikman 1966, 1969a, 1969b; Castaneda 1970, 1974, 1975, 1976) and that in states of de-automatization the phenomena observed are those ascribed to preconscious processes. Some of these have been discussed earlier in relation to Deikman's work. I shall now look at some other research which further illustrates the character of preconsciousness.

The preconscious processes relevant to my discussion are of two kinds: those concerned with perceptual inputs and those concerned with cognitive-experiential outputs. The kind involved in motor outputs (Frith 1979) need not concern us here. In respect to the first type it has been shown that preconscious input processes have a much greater capacity than conscious ones (e.g., Miller 1956; Sperling 1960; Atkinson and Shiffrin 1971; Erdelyi 1974), they respond to multiple meanings of word stimuli (Marcel 1976), they are multi-channel processes (Shaffer 1975) as opposed to serial conscious processes which can only deal with one task at a time (e.g., Broadbent 1958; Posner and Klein 1973; Posner and Snyder 1975). Shallice (1972) pointed out that in conscious activity there is operant a "dominant action system" whose goal is to direct a particular course of action at a time while keeping out of

conscious awareness irrelevant information and other possible courses of action.

All the above observations also hold true for the cognitive-experiential outputs of preconscious processes. In addition, this type of preconsciousness contains an enormous amount of unconscious material which normally remains on the borderline, checked by the current "dominant action system" of consciousness, but ever ready to break through. Under conditions which permit lifting of the filter, that is, on those occasions when a LEB takes place, preconscious processes come to the fore. The LEB diminishes or abolishes discrimination ushering in a loosening of conceptual and perceptual boundaries. Thus, objects merge into one another and their meanings change, concepts lose their sharpness and expand to include other concepts remotely related to them or become identified with apparently entirely unrelated concepts. Under conditions of LEB synaesthetic and hallucinatory phenomena come to the fore. Goldstone (1962, p.268) has argued that "hallucinatory experience can be accounted for in part by increased reduction in the conceptual intersensory boundaries", that is, by the loosening of distinctions between one sensory modality and another. Fisher (1962) proposed that confusion of the process of stimulus identification and localization results from the person's inability to demarcate his body bounds from what is "out there", i.e., it results from loosening of body schema boundaries.

Similar views to the above have been put forward by various workers to account for schizophrenic hallucinations (e.g., Hollender 1958; Schilder 1950; Fisher and Cleveland 1958; Phillips and Rabinovitch 1958; Bleuler 1950; Klüver 1942). Bleuler (1950), for instance, viewed schizophrenic hallucinations as reflecting the patient's confusion between perceptions and ideas as well as his inability to distinguish among his senses. In schizophrenia, where a LEB takes place, the lifting of the filter can also often be seen in the tremendously fast production of puns (e.g., Lecours and Vanier-Clement 1976), a phenomenon implying a lifting of semantic inhibitions and the

flooding of associations across many FsOR. More useful products of the LEB have been pointed out in the chapter on 'Creativity'. Warren and Gregory (1958) found that when a word was repeated again and again it transformed itself into other words or sounds. This is very similar to Eastern Yoga methods where a koan or mantram is incessantly repeated not only yielding results like those reported by Warren and Gregory but purportedly leading beyond that point to a total loosening of ego boundaries through a series of alterations of these latter. Similar effects of de-automatization have been reported by Deikman (1966, 1969a, 1969b) as having occurred to his experimental meditation subjects. In hypnagogia these phenomena occur spontaneously.

In Rorschach research investigators appear keen to point out that vividness of projection is linked to release of ego control (Klopfer 1954). This observation is of particular interest in my discussion because of the frequently reported association between vividness of hypnagogic imagery, lack of ego control, and sense of reality. As already noted, in the later stages of hypnagogia when LEB is most advanced, absorbed fascination and vivid imagery appear to cancel out, to eliminate the ability to test the reality of the situation. The subject has moved from a condition of hallucinosis, that is, of experiencing vivid imaginary events knowing that the latter are not 'real', to a condition where the sense of reality has supplanted reality testing, i.e., to hallucination. In earlier chapters, in discussing the relationship of hypnagogia to dreams and wakefulness, views were presented arguing for the placing of hypnagogia between 'buffers' (e.g., Vihvelin 1948) thus distinguishing it from both sleep and wakefulness. We also saw that Leroy (1933) although arguing for a distinction between hypnagogia and dreams he allows that sometimes the former is hard to distinguish from either dreams, wakefulness or real hallucinations. Notably, he argues that hallucinations need not be realistic in order to involve the subject, "what matters is the mental attitude of the

subject" (p.126). In this respect, hypnagogic visions which, according to Leroy, are never entirely realistic but always "fantastic", somehow manage to engage the cognitive processes of the subject to the extent of depriving him from the ability to test their reality. The subject, he argues, although a spectator,

he is not really before real events of practical life, nor is he quite in the presence of images which are stripped of all reality; in other words he behaves as if he is in front of something that can be real, but real or not, it does not concern him directly...what characterizes the hypnagogic vision is not the presence or absence of certain details, the richness or paucity of certain representations, it is the change of everything in the state of the subject...; the linking of representations is different here from what it is in the normal state.

(Leroy 1933, p.127)

It will be recalled that a similar remark about the linking of images in hypnagogia was made by Foulkes and Vogel (1965) viz., that the continuity of the imagery resides more in the subject's "understanding" than in the images themselves. Leroy uses the metaphor of the spectator in the theatre: there, as in hypnagogia, although the action unfurls beyond the control of the subject, the play takes on a reality of its own as a function of the subject's absorbed fascination and empathic investment. But the presence of empathy is impossible in the absence of LEB. It is in the presence of the latter that empathy and fascination can occur, and it is in this way that the experience becomes invested with a sense of reality — irrespective of whether the experience relates to anything 'real': reality sense is nonrational. Weisman (1958) juxtaposes reality sense and reality testing thus:

Reality sense deals with whole situations, rather than with parts of experiences. It is synthetic rather than analytic. Reality tests are intellectual, rational, and conceptual, while reality sense is emotional, intuitive and perceptual. For reality sense, objects are complete events in themselves, absolute and unequivocal. For reality testing, objects are parts of a wider context, whose relations must be determined. Its results are only approximate and conditional. Reality

testing finds its material in the conditions of experience, while reality sense functions with respect to the experience itself. Reality testing deals with shared experience through the common meaning of various propositions about it. Reality sense is essentially unshared, private, and complete in itself; it has no need for confirmation, since its criterion is the intensity, rather than the invariants of experience.

(Weisman 1958, p.246)

In agreement with my earlier arguments in respect to the non-rationality of the sense of conviction, Weisman remarks that "logical concepts based on observed evidence do not, in themselves, carry conviction, and the most ardently defended views of life are often without foundation in fact" (p.228). Further, the passivity-receptivity of hypnagogia may play its part in the absence of a reality testing attitude if, as Nunberg (1951, 1955) argued, the basis of reality testing is action. Weiss (1950) proposed that the sense of reality invested in external and internal phenomena is relative to the degree to which these phenomena enter the subject's ego boundaries and become "egotized" (cf., my argument for 'subjectification' of the object). With psychological field theories in mind (see e.g., Lewin 1935, 1936) Weisman (1953, p.233) remarks that "reality is rooted in the self, which sees it in its own image, regardless of how this is determined. The common nucleus of both the ego and its total field is the body image, which represents the condensed and fused experiences of many origins and many modalities". Interestingly, James (1890) defines the experience of the self in terms of the active "I", as opposed to a passively reacting consciousness. By contrast, in the passive-receptive mode of hypnagogia there is loss of self-consciousness.

According to James (1890) there is no single 'abstract' reality but many "live" hypotheses. Pepper (1948) argued that there are no absolute distinctions between real and unreal, thoughts and things, the world and the self. Reality, according to Cassirer (1953), is dependent upon the conceptual correlation of systems of experience so that when we speak of something being real we are not so



much referring to the object itself as stating our own logic and criteria in regards to an experience. Similarly, Weisman (1958, p.255) proposes that "the statement that an object is real,...means that it is real with respect to certain fixed criteria". On the other hand, Whitehead (Johnson 1952) regarded intuition or direct experience as the test of knowledge, and both James and Whitehead stressed the vivacity of a perception as a criterion of reality.

However, as Weisman (1958, p.256) correctly points out, "if the conceptual reference is altered, previously irrelevant features become the invariants of another type of reality". Moreover, different modes of thinking, as the same writer remarks (p.231), contribute to the development of different kinds of reality. In respect to hypnagogia, I will argue that both conceptual reference and mode of thinking are different from those of wakeful reality. Furthermore, it is debatable whether the same criteria characterized by focal attention (Schachtel 1954) and logical reasoning (Hart 1946) employed for the verification of phenomena pertaining to wakeful reality (-ies) can be legitimately applied to the experiences of the state of hypnagogia where the LEB introduces an entirely different logic (receptive vs active, diffuse vs focal, release of ego control vs tightening of such controls) thus suggesting the requirement of a different set of 'verifying' criteria. Strong support for my argument is afforded by the fact that although the sense of reality (and even test of reality: cf., James and Whitehead on the vivacity of a perception) in respect to wakeful experience is correlated with considerable emotion, and "an experience in which we are totally disinterested is also one which does not impart a sense of reality" (Weisman 1958, p.241), in hypnagogia the subject may, and often does, experience a strong sense of reality coupled with vividness of imagery which are, nonetheless, accompanied by flatness of affect.

Thus, the LEB ushers in a state of consciousness characterized on the physiological level by

parasympathetic, trophotropic and hypometabolic features and on the psychological level by regressive-paralogical (passive-receptive, autistic, dereistic, egocentric, pre-conscious, prelogical) mentation.

In earlier chapters, the concepts of the subconscious and unconscious were also used as more or less equivalent terms to stand for mental activities transpiring outside consciousness but which, nonetheless, may become conscious — at which point they are called preconscious. Although I shall avoid entering into an involved discussion as to the appropriateness of the use of one term or another I would like to discuss briefly another term introduced by Prince to explain multiple personality phenomena, namely, the term co-consciousness (Sidiş 1912, uses the term sub-consciousness to carry the same meaning). Prince (1922, p.167) defines co-conscious visual imagery as "psychical images of which the individual is not aware and therefore are subconscious". By means of hypnosis and automatic writing Prince was able to present data and argue that within each individual human being there are psychological layers, subsystems, or 'personalities' that could often act independently, concurrently, and in ignorance of each other. In automatic writing the subject would pick up a pen and, without looking at what she was writing, compose something intelligible the contents of which were either entirely outside her consciousness at the time or rose up into her awareness in the form of visual imagery. The writing was claimed to be produced by a second personality which was unknown to the first (the subject). Similarly, through hypnosis a second or third personality would emerge.

Interestingly, Prince (1907, p.70) noted that although "in its most highly developed form" automatic writing was produced while the writer was fully awake, "often and perhaps most frequently the writer falls into a drowsy condition" which sometimes leads to sleep (but which latter apparently does not prevent the writing personality from continuing to write and to declare that the subject "has gone to sleep"). The emerging imagery is detailed, vivid,

and likened to cinema movies, to dreams, crystal visions, and hypnagogic imagery (1917, p.312). When spontaneous, it tends to emerge at times when the mind is relaxed and "passive", e.g., at night (1922, p.204). When corresponding to the content of the script being written at the time it is much richer in detail and more concrete than the latter and more so than ordinary conscious imagery. Imagery known to a second personality (P2) may erupt into the consciousness of the first personality (P1 or subject) in the form of a hallucination (1917, p.306). Such imagery shifts and changes without apparent connections; the latter are only obtained from another personality, P2 or P3, through the continuity of the script. Inexplicable moods which the subject may experience in ordinary waking life are explained by a "deeper" personality as the effects of subconsciously unfolding imagery, i.e., imagery present in the subject's mind but not in her consciousness. Moreover, since "more than one subconscious system may actually function at one and the same time" (1922, p.193), emerging imagery and moods may be an amalgam whose elements come from a number of FsOR and which might be mediately and tenuously associated or entirely unrelated to the subject's current conscious thoughts. A great deal of subconscious imagery, however, may incubate for a very long time and may even never emerge into the subject's consciousness unless given conducive circumstances.

The relationship of the above to the phenomenon of hypnagogia hardly needs stressing. The concreteness, vividness, detail, autonomy and often irrelevancy of the imagery, are clearly pointed out. The linking of the unassociated images by means of the script has its parallel in hypnagogia in the continuity forged in the mind of the subject (e.g., Foulkes and Vogel 1965). The presence of imagery underlying moods was pointed to by van Dusen (1972) in respect to hypnagogia and related states. The multi-sociative character of hypnagogia has also been pointed out. In addition, Prince (1917, p.311) drew indirect attention to the 'regressive' character of automatic writing by pointing out that what reaches the

consciousness of the subject are only the "sensational elements" of thought and ideas that may exist on "deeper" levels.

Partially related to Prince's ideas are Luria's and Vinogradova's (1959) "semantic fields or systems" a number of which may exist in a person's unconscious and which may be independent or even contrary to each other. The free emergence of such contrary semantic systems as well as the concurrent emergence of Prince's "layers", "strata", or "personalities" can be facilitated by hypnagogia through the LEB. That is, the LEB may cause the disengagement of a dominant system or its relegation to a less dominant position while allowing — due to its 'loosening' character — for the simultaneous emergence of normally 'filtered-out' systems, complexes and multi-aspected phenomena.

It may thus be said in summary that the whole array of hypnagogic experiences is due to the presence of the root phenomenon of LEB. This phenomenon leads to, or is characterized by, body schema alterations and dissolution, "regression" to earlier modes of experiencing exemplified by the blurring of the distinction between ego and the external and internal environment and by synesthetic, kinesthetic and empathic experiences and the primacy of reality sense over reality testing (and, therefore, vividness of imagery). It also endows the state of hypnagogia with the character of preconsciousness, that is, of sensitivity and openness both to external and internal stimuli that may lie outside the normal reach of consciousness: it lifts the filters imposed on the mind by the consciousness and logic of the waking state. This allows for the emergence of material and FsOR from deeper layers of the mind, layers which are normally relegated to the unconscious. Due to the subject's loosening of strictures and to his empathic disposition, the emerging material and FsOR tend to cross and fuse with each other giving rise to novel entities and concepts, in addition to furnishing him with raw elements that might not otherwise have reached his consciousness. The occurrence of this phenomenon would, thus, explain not only the experiences of hypnagogia but,

through the latter, would also shed considerable light on the experiences encountered in states and processes such as schizophrenia, psi, meditation, and creativity.

## CHAPTER 19

### THE FUNCTION OF HYPNAGOGIA:

Given that hypnagogia possesses the properties ascribed to it, what is its function? The obvious answer, viz., that it prepares the organism to enter sleep, as the term indicates, (see also: Meddis 1977) is not entirely satisfactory in view of the evidence that it does not always or necessarily lead to sleep (e.g., McNish 1830; Maury 1848, 1878; Alexander 1909; Rouquès 1946; Collard 1953; McKellar and Simpson 1954; Myers 1957; Green et al 1970) and that, not infrequently, hypnagogic visions occur with open eyes (Müller 1845; Hervé de Saint Denis 1867; Alexander 1909; Leroy 1933; Rawcliffe 1952; McKellar and Simpson 1954; Myers 1957; McKellar 1972). The analysis carried out in this paper has shown not only that hypnagogia possesses individual features but also that its presence in certain states of consciousness may carry causal implications.

As Leroy (1933, p.94) observed, in hypnagogia there is "a special attitude of my whole being notably different from the way I feel in wakefulness". Alexander (1909, p.629) spoke of "a curious mingling of sleep and wakefulness". Trömner (1911), Lhermitte and Sigwald (1941), Froeschels (1946) and de Becker (1968) referred to it as "a special state of consciousness". The Libersons (1966, p.302) relating it to the more general experiencing of "vague types of thinking in the midst of our daily activities", suggest that it might have a "biological significance", that "it may represent a biological necessity to turn the environment out of focus, to blur for a time the 'here and now', and to allow a less realistic relationship to take place between various elements of our mental life". Indeed, the Libersons' suggestion may be more tightly related to a regularly occurring basic rest-activity cycle (BRAC) observed and already related to the 90 minute nocturnal sleep pattern (see e.g., Maron et al 1964; Globus 1966; Fisher and Friedman 1967; Kleitman

1969; Othmer et al 1969; Oswald et al 1970; Dement et al 1972; Globus et al 1972), which takes us back to the relationship between hypnagogia, sleep, and sleep dreams. In what follows I shall take a closer look at these relationships in the perspective of the BRAC, and further examine the possibility that hypnagogia might have a special functional and evolutionary significance.

As Sterman (1972, p.195) remarked, the BRAC is "a fundamental aspect of physiology, both functionally and in terms of the structural evolution of the CNS. The controlling mechanism has been localized to the brain stem, and in the absence of forebrain integration expresses its influence overtly as a periodic modulation of neuronal excitability". Kleitman (1967) saw it in terms of man's organization of his working day into approximately two-hour recurrences of work, feeding, and rest. A suggestion flowing from the Libersons' (1966) observation and the data in the above studies is the existence of a circadian fluctuation in the neurophysiology underlying the REM dream state embracing both sleep and waking periods. More important, from the psychological point of view, is the circadian presence of the experiential aspects of the state.

Fiss, Klein and Bokert (1966), Lavie and Giora (1973), and Lavie (1974) have shown that there is a "carry over" effect from a particular sleep stage into the waking state. Unlike previous research which concerned itself with eliciting dream reports from subjects awoken from different stages of sleep (e.g., Aserinsky and Kleitman 1953; Dement 1955; Dement and Kleitman 1957a, 1957b; Wolpert 1960; Wolpert and Trosman 1958; Foulkes 1962; Rechtschaffen et al 1963; Goodenough et al 1965), Fiss et al concentrated on the hypnopompic responses of their subjects to Thematic Apperception Tests upon awakenings from REM and NREM sleep. Thus, they found that REM awakenings yielded more bizarre and "dream like" mentation than their NREM counterparts. Lavie and Giora (1973) and Lavie (1974) utilizing the spiral after effect (SAE) method which relates the persistence of visual stimuli to cortical excitability (Holland 1964) confirmed Fiss et al's results and were in agreement with

Broughton's (1968) findings on differential visual evoked responses between REM and NREM awakenings and Costello's (1963) results on the similarity of the decrease of the SAE during NREM awakenings and CNS depressant cases.

Such observations tend to suggest that the recurrent phenomenon of dreaming might continue "under conditions of reduced or impaired arousal which are ordinarily lumped within the waking category" (Snyder 1963, p.383). Moreover, as Globus (1966) importantly proposes

the D state [REM state] has essentially nothing to do with sleep itself, but rather it is only during sleep that the D state can be measured by current techniques. Thus the characteristic Stage 1, the REMs, and the decreased muscle activity are not the essential process itself, but only signs by which the process can be recognized. Because of the ongoing state of the waking organism it would be extremely difficult to pick up such signs.

(Globus 1966, p.657).

This is in agreement with Snyder's (1963, p.383) suggestion that "the condition of typical behavioural sleep is not indispensable for dreaming". Indeed, as Snyder further points out, although REM sleep is generally thought to be a 'deeper' state than NREM sleep from the point of view of arousability, this is not always the case (see e.g., Snyder 1960; Williams, H: in Snyder 1963, p.383) as can be seen from evidence suggesting that "we can respond to external stimuli during dreaming sleep when sufficiently motivated, but that ordinarily we are distracted by the internal events of the dream experience" (see also: Christake 1957; Rowland 1957; Toman et al 1958; Oswald et al 1960; Granda and Hammack 1961). In fact, in addition to the REM state being distinguished from the NREM kind on psychological and physiological grounds (e.g., Jouvet 1961, 1967), accumulating evidence on brain activity during the REM state (e.g., Evarts 1962a; Huttenlocher 1961; Mikiten et al 1961; Snyder 1965, 1966) tends not only to confirm that this is a different organismic state from waking and sleeping but that "in certain respects it may be the most active one" (Snyder 1963, p.385).

However, it must be borne in mind, in the perspective



of my earlier arguments on dreams and brain activity, that imaginal activities correlated with the activities of subcortical structures may reflect in the alteration of certain parameters which, although appear similar to those of wakefulness, they may originate in different brain structures and neuronal organization and carry a different meaning. Thus, to be imaginally active must not be equated with being awake. This is clearly demonstrated in the Fiss et al (1966) experiments where the subjects awoken from REM sleep responded almost as if they were still dreaming. Although subjects in a similar situation (Broughton 1968; Lavie and Giora 1973; Lavie 1974) showed responses similar to wakefulness, in the Fiss et al study the measurements were psychological whereas in the other studies they were physiological, and, as pointed out above, these latter parameters do not necessarily reflect the same internal (psychological) organization of the organism in wakefulness as in dreaming. Thus, although activity in the mesencephalic reticular formation during REM states may be even higher than that recorded during wakefulness (Huttenlocher 1961), it would clearly be a mistake to interpret this as meaning that the subject in a REM dream is more awake than a person in the waking state - although he may be more aware imaginally. As Snyder (1963) points out, the Jouvet (1961, 1962) studies have shown that the cerebral tracks involved in the production of REM sleep are not those of the ascending reticular formation responsible for waking arousal:

Interruption of the reticular formation at the level of the mid-brain tegmentum does not interfere with the periodic recurrence of rapid [REM] sleep so long as the ventral mesencephalon is left intact at the level of the interpenduncular nucleus and mammillary bodies.

(Snyder 1963, p.386).

We already know from earlier discussions that neurological lesions in the above mentioned nucleus result in "peduncular hallucinosis" characterized by visual hallucinations closely related to hypnagogic visions in form and time of occurrence, viz., at sleep onset (see e.g., Lhermitte and Sigwald 1941; Rozansky 1959). Also, in

respect to my relating hypnagogic experiences to the limbic system, the latter was found to be connected with the pontile reticular formation via a ventral mesencephalic circuit (Nauta 1958). Moreover, it has been observed that introduction of cholinergic drugs into the ventricular system results in hallucinatory behaviour (McLean 1955; Sherwood et al 1952). The same drugs have been found by Jouvet and his collaborators to lengthen the period of REM sleep in the cat. This type of sleep was also triggered off by electrical stimulation of the pontile reticular formation during slow (NREM) sleep.

Although we continue to speak of REM sleep as an equivalent way of referring to nocturnal dreams, as pointed out by both Snyder (1963) and Globus (1966) dreaming may have nothing to do with sleep either physiologically or psychologically. On the other hand, it is also distinguished psychophysiologicaly from wakefulness. To refer to Snyder once more, there is evidence

that the function of dreaming is not dependent upon sleep, per se, but rather upon the relative absence of stimulation - that dreaming tends to supervene with regular periodicity throughout the 24-hour cycle, but that the extent of its manifestation is inversely related to the level of reticular arousal at any given time. 'Daydreaming' may be more than a figure of speech!

(Snyder 1963, p.384).

An area that provides information relevant to the foregoing arguments is that of narcolepsy. The narcoleptic syndrome comprises four characteristic symptoms, namely, hypnagogic hallucinations, cataplexy, sleep paralysis, and hypersomnolence (Yoss and Daly 1957). Two symptoms of this syndrome, hypnagogic hallucinations and sleep paralysis, have been pointed out by Liddon (1967) as fitting exactly the older descriptions of nightmare (e.g., Waller 1816, McNish 1830). Kanner (1957), also, pointed to the hypnopompic nature of children's nightmares. As part of the narcoleptic syndrome, hypnagogia has been related physiologically to both the reticular activating system and the REM dream (Rechtschaffen et al 1963a; Rechtschaffen and Dement: cited by Liddon 1967, pp.91-92). As already known,

the ascending RAS and the rostral parts of the reticular system have been linked with arousal and wakefulness, while the descending RAS is associated with motor activity (e.g., Oswald 1962). It is thought that "a breakdown of the synergistic functions of these units in the RAS involving consciousness and motor activity results in cataplexy, sleep paralysis, and hypnagogic hallucinations" (Liddon 1967, p.91). Complex interactions in the ascending RAS are implicated in the production of the EEG stage 1 forebrain structures characteristic of REM sleep. On the descending side of the RAS a generalized reduction of muscle tone is observed especially round the head and neck accompanied by loss of spinal reflexes during REM sleep in normal subjects, and in narcoleptics (Hishikawa et al 1965). While cataplexy and sleep paralysis are thus thought to display the motor characteristics of REM sleep in a waking state, it is hypothesized (Rechtschaffen and Dement: cited by Liddon 1967, pp.91-92) that hypnagogic hallucinations constitute the dream counterpart of the REM period sleep. Rechtschaffen and Dement put forward a theory embracing three relatively independent neurophysiological systems: Wakefulness, Sleep and a Paradoxical system. The latter's characteristics include atonia, reflex inhibition, and dreams. The Paradoxical system comes into operation when the other two systems relax their inhibitory influence over it. However, since these 'paradoxical phenomena' occur in isolation it is thought that there are different thresholds for their release.

Thus, on the evidence afforded by a number of studies showing a circadian fluctuation of the REM period potential not confined to the hours of the night, it is possible that the Paradoxical system might break through more easily at those times during the day or night when neither of the other two systems is in full swing. This way, hypnagogic experiences might appear at a time when the REM potential is on the increase, and, although it has not yet overtaken wakefulness, it has reached over the threshold of hypnagogia. It might, thus, be reasonable to argue, along with Liddon, (1967, p.92), that "hypnagogic hallucinations

represent aspects of REM periods occurring during the waking state". And since hypnagogia, or at least its earlier stage, is characterized by full- or semi-consciousness, it would also be reasonable not to expect all the neurophysiological correlates of the REM period to be present (e.g., REMs, penile erection). Further, although sleep paralysis and hypnagogic hallucinations are observed to occur together mostly in narcoleptics (see also chapter on 'Psi'), a lighter paralytic state is not infrequently present during hypnagogic experiences. Leroy (1933, p.115) describing this aspect of hypnagogia, writes: "After an undeterminate period it happens that I always lie on my back and feeling myself awake I want to open my eyes... Impossible! But I do feel (I observe this) that my eyelids are stuck together, as they might be for certain persons on awakening, but I cannot raise them". Commenting on this Sartre (1978) says that it is "a unique condition which may be described as paralysis by auto-suggestion", and that it is clearly

[not] a simple sensation of peripheral origin, like the relaxing of muscle tone.... To the pure and simple muscular sensation (impression, or distention, repose, abandon) there is added the sui generis consciousness that it is impossible to will these movements, we no longer feel capable of animating our body. This is a condition of very slight auto-suggestion, distantly related to hysterical pythiatism and to certain frenzies of influence. We ourselves forged this unbreakable chain. Let a disturbing noise resound and we are at once on the alert. But so long as we remain undisturbed we are muscularly relaxed and instead of simply and purely constituting the hypnosis, consciousness permits itself to be charmed, in the strict sense of the word, that is, consciousness does not constitute the hypnosis but sanctions it.

(Sartre 1978, pp.46-47).

Under normal circumstances, hypnagogia can only take place when the subject is relaxed both physically and mentally, that is, when no anxiety is present. Conversely, when the subject is deprived of sleep, especially the REM kind (e.g., Luce and Segal 1966) the hypnagogic threshold becomes much more readily reached during those hours of the day and night when the REM potential is normally on its circadian increase. The subject then experiences peaks

of vivid hypnagogic imagery ("microsleeps" and "dreamlets") preceded and accompanied by known hypnagogic features (see section on 'sleep deprivation' in chapter 14). As McKellar (1977, p.104) remarked, "hypnagogic imagery is testimony of the readiness of dream life to invade wakefulness". These observations are in agreement with Fiss et al's (1966) argument that the "spill over" dream-like phenomenon observed in their subjects' TAT responses when interrupted from REM sleep constituted a result of slight REM deprivation. Evidence of hypnagogic-hypnopompic "spill over" is also afforded by the reports of patients who began to have hypnagogic-hypnopompic hallucinations as a result of treatment with antidepressant drugs (Lehman et al 1958; Klein 1965; Schlauch 1979; Hemmingsen and Rafaelsen 1980). Antidepressant drugs such as imipramine are known to increase NREM sleep and the phenomena associated with it (e.g. Flemenbaum 1976; Huapaya 1976). Conversely, they deprive the patient of REM sleep (e.g., Vogel 1975, 1977). Thus hypnagogic-hypnopompic experiences in these cases may be considered as spill overs of REM dream deprivation.

Now, in view of arguments supporting the notion that dreaming is an activity independent of wakefulness and sleep, and since the only kind of naturally occurring dream in the absence of sleep is the hypnagogic dream - seen as a circadian phenomenon occurring independently of REM sleep deprivation - it seems reasonable to propose that hypnagogic experiences may constitute that kind of human need and type of mentation which demonstrates itself as the REM syndrome during sleep and as a fantasy or hallucination during wakefulness. This view would accommodate both Fiss et al's (1966, p.550) argument that waking fantasies may take the place of aborted dreams, and the arguments of depth psychologists that (REM) dreams may facilitate the gratification of wakeful fantasies - and this, without necessarily restricting hypnagogia to such functions.

Thus, hypnagogic-hypnopompic experiences may constitute the dream component of life's triptych: dreaming, sleeping, wakefulness. In this guise, i.e., as dreams, I will also argue that they are both phylogenetically and ontogenetically older than sleep and wakefulness. Meddis (1977,

p.136) has argued that active (REM) sleep, that is, sleep during which dream activity takes place in humans "is a state analogous to and descended from reptilian sleep". Jouvett, Valatx, and Jouvett (1961) found that in newborn kittens there is only an alternation between active sleep and waking, the other kind of sleep (slow, quiet) developing later. Likewise Serman (1972, p.194) argued that "sleep does not exist in the newborn infant". He remarked that other investigators (e.g., Kleitman 1963, 1969; Emde and Metcalf 1970) made similar observations noting that although the state of quiescence in the infant does not properly qualify for the term quiet sleep as applied to adults, "the REMs state is clearly present in the newborn. This state recurs regularly and without interruption throughout the first weeks of life, regardless of whether the infant is quiet or engaged in such activities as sucking, crying or fussing" (p.177).

The view of hypnagogia as constituting the exemplification of a circadian organismic system gains more credence when seen as having a survival function. Evidence comes from various studies on hypothalamic stimulation and physiological measurements during sleep onset. Hess' (1931, 1932, 1957) discovery of the trophotropic response in the cat described as "a protective mechanism against overstress belonging to the trophotropic system and promoting restorative processes", points to the existence of a neurophysiological and biochemical network closely linked to the parasympathetic system and functioning in opposing terms to that of Cannon's "fight-or-flight" or "defence-alarm" reaction which is linked to the sympathetic system and marked by increased breath rate, heart rate, blood pressure, blood flow to the muscles, oxygen consumption, and body metabolism. By contrast, hypnagogia is characterized by lowered oxygen consumption, and decrease in heart rate and respiration. In addition, with reference to evidence that the presence of increased blood lactate levels is instrumental in producing anxiety (Petts and McLure 1967), we may infer that this substance is decreased during hypnagogia. This inference is not based only on the fact that lack of

anxiety is a necessary feature of the induction of hypnagogia but also because blood lactate is produced by the metabolism of skeletal muscles which must be relaxed during sleep onset. Thus, in hypnagogia there is a shift from sympathetic to parasympathetic predominance involving the relaxation of striate muscles and the reduction of proprioceptive input which, according to Gellhorn (1964), cause a resetting of hypothalamic balance. Indeed, hypnagogia may constitute a protection from certain harmful effects of both wakefulness and REM sleep. In respect to the former, the beta EEG activity characteristic of this state has also been associated with anxiety (Hill: in Hill and Parr 1950) and various psychiatric disorders (Finley 1944). On the other hand, the REM sleep has been found to exacerbate stomach ulcers and heart problems (Meddis 1977, p.137).

It transpires, then, that hypnagogia has a hypometabolic function in that it acts as an anxiety reducer periodically drawing the organism away from the tension-producing activity of the sympathetic system. It might be objected, however, that hypnagogia (sleep onset) sometimes displays myoclonic spasms and terrifying visual images that are far from being conducive to either physical relaxation or reduction of anxiety. Nonetheless, both of these phenomena occur against a background of initial physical and mental relaxation and, in normal subjects, eventually subside and disappear as the state deepens. In this respect, hypnagogia may be related to various therapeutic techniques based on induced relaxation such as Progressive Relaxation (Jacobson 1929), Sentic Cycles (Clynes 1970), and Schultz's Autogenic Training. A common psychological factor in these methods and states is a turning away from the realities of the immediate environment. More specifically, there are clear similarities between the early stages of hypnagogia and autogenic training (Schultz and Luthe 1959), the latter emphasizing "passive concentration" in contrast to "active concentration". The technique aims at the "autogenic shift", or Umschaltung, characterized by muscle relaxation, increased skin temperature, slowed respiration and heart rate, i.e., a shift to parasympathetic

predominance. Reports by subjects of flowing warmth and a light quality in the retinal field while their eyes are closed (Eigenlicht?) coupled with Luthe's remark that the autogenic shift is not characterized by drowsiness, show it to be very similar, if not identical, to an early hypnagogic stage.

In view of the foregoing arguments it would be inappropriate to say that there are REM potentials during the 24 hour day, but rather that there are potential periods of Oneirosis and that REM dreams form one expression of this potential. I shall designate Oneirosis as that psychophysical syndrome which includes dreams and dreamlike phenomena such as hallucinations and quasi-hallucinations, it is characterized by the organism's LEB, and, when spontaneous, it is circadian following a basic rest-activity cycle (BRAC). In this scheme, hypnagogia would constitute the exemplification of Oneirosis. It has all the advantages of REM dreaming and none of its disadvantages. It may render us the same service as REM dreams do but without the necessity always to surrender consciousness as completely as we do for the emergence of REM dreams. As Marc (1840) once put it, it enables us "to dream without sleeping" (quoted by Baillarger 1846). According to Archer (1935), it constitutes "waking dreams" (p.41) or "dream-activity proceeding under the observation of the waking mind" (p.44).

As a progressive state hypnagogia stretches from a slight dissociation from the surrounding reality to a more complete dissociation wherein the subject is deeply involved in his imagery but still aware of his surroundings (double consciousness), to a complete loss of reality testing (dreaming), then back to an awareness of the surroundings but still involved in the 'dream' state (double consciousness), then waking but retaining double consciousness ('hypnopompic'), then back to wakefulness. Viewed in this perspective, sleep-dreams become simply a sequence of the hypnagogic-hypnopompic state of Oneirosis, sleep-dreams being only one among a variety of types of dream (incidentally, sleep, or REM, dreams are probably the main, if not the only, kind of dream psychoanalysis appears to be generally concerned with). Indeed, there are no



compelling theoretical or experiential reasons why a person could not, with appropriate training (e.g., by means of biofeedback), remain 'awake' during sleep experiencing a deep Oneirosis instead of having partial or complete loss of consciousness. As West (1962, pp.285-6) pointed out in his general theory of hallucinations and dreams, some people are capable of achieving hallucinations by gaining control of their own dissociative mechanisms.

Such achievement would most likely place an individual in a position of contact with many aspects or layers or systems of his personality. As we saw, in relating hypnagogia to various states of consciousness, this is indeed the case. I am thus in full agreement with Sherwood who pointed out that hypnagogic experiences

reveal to us even more clearly than the ordinary dream the construction of our mental activity in its usual forms and if we observe them attentively we may gather conclusive evidence of the many levels of awareness which combine to form our ordinary consciousness. This half-way state performs for us the difficult operation of separating the modes of consciousness and giving us glimpses of their independent activity - a feat impossible to achieve voluntarily while in full possession of the blended mode.

(Sherwood 1965, p.94)

It is interesting to note in this respect that as far back as the tenth century A.D. a Tantric text advised the aspiring yogi that in order to acquire continuity of consciousness unaffected by sleep "he must hold himself at the junction of all the states, i.e., in the half-sleep state, the link between waking and sleeping" (Esnoul: quoted by de Becker 1968, p.154). Significantly, this state is designated by the exponents of the above tradition as the Fourth State, the other three being sleeping, dreaming and waking. In this state, as a hypnagogic subject observed, "one has attained, while awake, the concentration which exists during dreaming" (J.S.P.R. July 1898, p.269).

Thus, since in hypnagogia there is the possibility of holding a "dialogue with the unconscious" (de Becker 1968, p.163; see also van Dusen 1972) and dreaming without losing consciousness, the induction of this state may not be considered as a mere "regression" to the evolutionally old

dreaming state but perhaps more of a 'return' with the added advantages of an enriched consciousness. In this way, the oneirosis of hypnagogia, encompassing as it does numerous states of consciousness, may indeed be spoken of as an altered state of consciousness accompanied by changes of thought organization which, as in Deikman's (1971, p. 488) receptive mode, are arranged "in terms of a different logic in pursuit of aims located along different dimensions of reality than those to which we ordinarily address ourselves".

The logic of hypnagogia points both to the evolutionary seniority of oneiric life and to the survival value of hypnagogia itself. In respect to the first point, it is clear that, if oneiric life preceded the appearance of wakefulness and sleep, then, prior to the appearance of these latter two states the organism must have existed in a continuous state of dreaming. This would imply that, inter alia, the logic of wakefulness was absent and that a different logic, that of empathy, fusion, a strong feeling of being inseparably part of a whole, lack of distinction between inside and outside, and lack of self-consciousness must have been the qualities of that early life. Later, gradually, appears what we now call wakefulness. We saw in earlier arguments that this is indeed the case with human infants - their lives alternate between dreaming and waking. But, significantly, the quality of the early oneiric experiences also implies that there was no feeling or need to fight for survival. The latter must have arrived on the scene with the appearance of the waking state and the direction of attention (which gradually acquires an 'active' component) to sensations, perceptions and, generally, to the external reality. Thus also emerge a dim self-consciousness and the need to survive as a separate entity. This is where, I believe, sleep as a separate state also makes its presence obvious: the emergence of the waking state has not obliterated the need to dream but merely subdued it periodically; however, organismic life has begun to become individualized and the need to survive as an individual entity now utilizes the mechanism of sleep for the safe emergence of full oneiric activity. This line of argument suggests that one function of sleep

must have been, and still is, to provide the conditions necessary for the occurrence of dreaming and at the same time secure the organism's safety during that most vulnerable period when its attention is withdrawn from its immediate physical surroundings. The organism's safety is secured by the induction of drowsiness which sends it looking for a safe place where to retire and give itself up to dream activity (cf. Meddis 1977).

The second point raises the question that, if physical survival were a primary concern of evolution, should we not by now have developed into non-sleeping beings adjusting the functions of sleep to some form of waking state thus ensuring against our vulnerability during the regularly occurring abandonment in sleep? Also, if apart from providing the necessary conditions for the emergence of oneiric activities, sleep has other physiological functions, e.g., physical recuperation and tissue repair, could these latter functions not be fulfilled without the organism having to always abandon consciousness to the degree it does during sleep?

Now, a careful study of hypnagogia shows it to be the state most perfectly fulfilling both the functions of sleep and dreaming. Discussions throughout this paper (see especially chapter on 'Dreams') have shown hypnagogia to be, at times, indistinguishable physiologically and behaviourally from sleep. It has also been shown to be a dream state. Although it has often been stressed in this paper that the subject in hypnagogia is psychologically withdrawn and fascinatedly involved in imaginal activities, it has also been noted that many subjects can retain awareness of their external environment and hold conversations or have other thoughts unrelated to their concurrent hypnagogic imagery (see e.g., Maury 1878, p.60; Leroy 1933, pp.59-60; Oliver 1976; McKellar 1979b, p.101). It has been suggested that this is an ability that can be cultivated with the appropriate training involving the manipulation of one's attentional state(s) (e.g., Green and Green 1978). For instance, at the early stages of hypnagogia when attention is still to a great extent concerned with the external

reality, hypnagogic experiences, e.g., imagery, tend to be brief and faint. As psychophysical relaxation increases and attention becomes more internalized imagery becomes more vivid and less fleeting. At this point one may become more 'awake' (e.g., Maury 1878; Leroy 1933) and achieve double-consciousness providing he remains cool and unemotional (Leroy 1933, pp.59-60), slightly biasing his receptive attention towards the imagery.

In this latter state one appears to be dreaming during wakefulness (Stoyva 1973, p.399). One obvious advantage this state has over sleep dreaming is that it facilitates 'dream interpretation' through immediate introspection (see e.g., Slight 1924; Kubie 1943; Silberer 1965; McKellar 1979b). Such interpretations need not restrict themselves to the psychoanalytic variety. Not infrequently, hypnagogic experiences convey 'anagogic' meanings, that is, they refer to future resolutions of problems (see, e.g., Leroy 1933, p.120), or they may contain symbolic references to the subject's current state of physical and psychological health (van Dusen 1972).

Thus hypnagogia's conferring of double-consciousness on the subject, i.e., the ability to retain consciousness of one's surroundings while dreaming, is a definite evolutionary advance over sleep dreaming: it enables a person to retain control over his external environment while investigating his internal terrain. An individual may, then, learn to oscillate in and out of hypnagogia to any desired degree. He may, for instance, return to the full waking state in order to attend to conditions requiring the employment of the waking mode, or move further into an oneiric state and become more deeply involved in internal imaginal activities. Of great importance here is the observation that in order to acquire double-consciousness in hypnagogia the subject must learn to relax physically, emotionally and intellectually (see e.g., Green and Green 1978). Interestingly these are precisely the conditions required for the induction of hypnagogia, in the first place. In other words, learning to balance oneself in hypnagogia lies along evolutionally normal and natural directions. This

is also borne out strongly by the advantages conferred on the subject in the production of hypnagogia.

First, as noted earlier, physical relaxation in hypnagogia is bound up with a shift to hypometabolism and conservation of energy. Physical relaxation alone has been shown to raise one's threshold of excitability and diminish the apparent unpleasantness of painful stimuli (Miller 1926), that is, a person becomes more tolerant of physical pain and reacts less violently against stimuli. The lessening of excitability points to the second observation, namely that of emotional relaxation. Many hypnagogic reports stress the lack of affect and the detachment experienced by the subject. This has two advantages. One, it combats anxiety whose presence in high levels is often associated with disproportioned and exaggerated appreciation of one's circumstances - in this respect, it also combats the appearance and/or exacerbation of ulcerations. Two, it equips the subject with the necessary 'coolness' of attitude that enables him to deal detachedly with both experiences pertaining to internal phenomena and those concerned with the external world. Indeed, the very induction of hypnagogia and the subject's participation in his hypnagogic experiences seem to be primarily dependent on his 'detached involvement'. Third, intellectual relaxation implies the "removal of constraining mental sets and controls" (Hollingworth 1911). This renders the subject more tolerant and accepting both of his own nature and of the views, attitudes and personalities of other people.

Confirming the above observations are the findings of a number of investigators whose works have been referred to elsewhere in this paper in respect to the therapeutic value of hypnagogia and to the view that proficient hypnagogists are characterized by psychological health and expansive and creative traits (e.g., Foulkes et al 1966; Green et al 1970, 1971, 1971a; Budzynski 1972, 1977; van Dusen 1972; Stoyva 1973; Green and Green 1978). For instance, Green and his collaborators found that biofeedback training for the attainment of consciousness and facility in hypnagogia was associated with physical and psychological

well-being, e.g., increased energy and "integrative experiences" such as gaining of self-confidence, improvement of interpersonal relationships, tolerance and understanding of others, healing and regeneration. They also noted an increased facilitation in the solving of personal and abstract problems, and the emergence of psi phenomena such as ESP. Notably, their biofeedback programme aims at training subjects in the production of theta rhythms in the EEG which are found to be "associated with a deeply internalized state and with a quieting of the body, emotions, and thoughts, thus allowing usually 'unheard or unseen things' to come to consciousness in the form of hypnagogic imagery" (Green and Green 1978, p.143).

Germane to the discussion of the function of hypnagogia are data and arguments presented in the chapter on 'Creativity' where it was pointed out that, due to its character of LEB, hypnagogia facilitates creativity both in terms of allowing unconscious material to surface, cross, fuse, etc., and in terms of its possessing the very same features believed to be characteristic of the creative personality, viz., spontaneity and effortlessness, expressiveness and innocence, lack of fear for the uncertain, ambiguous or unknown, ability to tolerate bipolarity and ability to bring together and integrate opposites.

The function and evolutionary value of hypnagogia may, thus, be summarized as follows: Hypnagogia constitutes the dream component of life's triptych: dreaming, sleeping and wakefulness. Although evolutionally older than sleep and wakefulness, it possesses features that allow it to straddle both, and even dispense altogether with the former. Moreover, it points to an evolutionally more advantageous state wherein the functions of both sleeping and dreaming may be served without the necessity to abandon consciousness as extremely as one does in sleep. In this state, the individual may remain aware of his surroundings while attending to dream activity which he interprets by immediate introspection and which may furnish him with solutions to personal and abstract problems as well as indicate the conditions of his physical and psychological health. Further hypnagogia has a hypometabolic function

which is related to the diurnal BRAC, thus periodically drawing the individual away from the stresses of full waking state and restoring and energizing him by a shift to parasympathetic activity. On the physical level, it raises his threshold of excitability and diminishes the apparent unpleasantness of painful stimuli by means of relaxation. The latter's emotional component reduces and nullifies anxiety thus both protecting the individual from the deleterious effects of excessive internal secretions and endowing him with the ability to become 'detachedly involved' in both external and internal, imaginal activities. On the intellectual level, the hypnagogic subject undergoes a removal of constraining sets and controls and becomes open to integrative experiences characteristic of the creative personality.

## CHAPTER 20

### THE SIGNIFICANCE OF HYPNAGOGIA:

In this last chapter I shall pick out and discuss in brief what I consider to be important points arising from earlier discussions in this paper, draw general conclusions and point out implications flowing from them.

I began this paper by listing the phenomena encountered in hypnagogia and took a brief look at the methods employed to study the conditions for their emergence and their presence in the general population. In later discussions, in comparing hypnagogia to other mental states, I often argued for the presence of hypnagogic mentation and imagery in these states and not the other way round. This might be objected to by some psychologists who relegate to the hypnagogic imagery a much less important role (e.g., Richardson 1969; Horowitz 1978). Even where it is given some prominence, this is immediately taken away from it by its being placed in a general context in which other types of imagery are also present. Richardson (1969), for instance, offers the following classification of imagery: after imagery, eidetic imagery, memory imagery, dream imagery, imagination imagery. The latter type includes: perceptual isolation imagery, sleep deprivation imagery, hallucinogenic drug imagery, photic stimulation imagery, pulse current imagery, meditation imagery, hypnagogic imagery. Richardson argues that the main difference between the various forms of imagination imagery "is in the antecedent conditions that arouse them and not in the phenomenal attributes that appear in the subject's reports" (p.93). Although I would not entirely disagree with his observation I will, nonetheless, point to another observation made in this paper, namely, that the phenomena he groups as "imagination imagery" share a measure of hypnagogia, that is, they emerge in a general climate of dreaminess or may themselves become hypnagogic. Moreover, as already argued, dream imagery is a species of hypnagogic imagery, sleep dreams often



occurring in hypnagogia. We have also seen that hypnagogia contains eidetic imagery in the form of "exact reproductions", that after-imagery of mental images is not infrequent at the hypnopompic end of the state, and that memory sequences are "by far the simplest line of thought to maintain" in hypnagogia (Singer 1976, p.44) — indeed, Maury (1857, p.164; 1878, pp.85, 90-92) argued that in hypnagogia memories are much clearer, richer in detail, and may contain sequences entirely outside the range of wakeful remembering.

Thus, it could be argued that not only is Richardson's "imagination imagery" tinged with hypnagogic dreaminess but also that his other groups are not entirely untouched by it: e.g., not all cases of eidetic imagery are devoid of a mixture of imagination, and memory imagery at its strongest and most vivid is indistinguishable from hypnagogic remembering. The possible exception might come from a specific type of after-imagery, namely, that produced by strong perceptions in wakefulness and experienced by the subject while still in the full waking state.

Such arguments strongly arise from methods of studying and inducing the state of hypnagogia, and are, therefore, closely linked with its definition. If we look back at the relevant sections in the first part of this paper we shall see that the only 'pure' kind of hypnagogic imagery is that found in spontaneous cases in which it emerges as a feature of sleep onset and is allowed to take its natural course as consciousness gradually wanes. But, as noted, Maury (1848, 1878) himself was the first to observe that hypnagogic imagery may not necessarily lead to sleep but, on the contrary, it may delay its arrival when attended to. Other workers have noted that hypnagogic imagery has nothing to do with sleep and that it can take place while the subject is engaged in other activities. Rouquès (1946, p.372), for instance, noted that he could think of past events and make complicated calculations while the images unfolded, and that the only reason he had for considering them "premonitory of sleep" was not any correlation with drowsiness, which was not present

when he experienced them, but the mere fact of their regularly occurring before sleep. Various investigators have also noted the relative ease with which they could conjure up imagery in hypnagogia as opposed to other times during the day when they were fully awake.

Arguments along these lines have led to the widening of the concept of hypnagogia and to the inclusion in it, or its identification with, a number of other states and conditions of the human entity. This, in turn, has shown hypnagogia to be not only a state in its own right but also capable of shedding light on the nature and psychological and physical mechanisms of other states, processes, phenomena and experiences. Careful analysis of data has shown that the only necessary and sufficient conditions for the occurrence of the state are physical and psychological relaxation and an inward turning of passive-receptive attention or psychological withdrawal from the environment. I proposed that the degree to which these factors are involved would constitute a stage in the hypnagogic process. I pointed out that the existence of stages has indeed been reported in the literature, and I suggested a three stage or layer system as a rough working framework for the studying of the state. Moreover, varied combinations of the above components would give rise to one or the other of those mental states we found related to hypnagogia. For instance, in a combination where the ranking of the components in terms of the importance placed on them was passive-receptive attention, psychological, and physical relaxation, such arrangement might favour meditation and psi states. The same ranking with a slight stress on active attention may favour creativity (when the latter is sought consciously in the full waking state).

The presence of the above components, I pointed out, ushers in the core phenomenon of LEB. I further argued for the correlation of this phenomenon, and its attendant phenomenology, with activities of subcortical structures, i.e., for a switch to oldbrain predominance characterized by a constellation of psychological features

and accompanied by parasympathetic prominence. I have also argued that the occurrence of hypnagogia, and its attendant LEB, is not temporally confined to sleep onset but that it takes place periodically throughout the 24 hour day. As Tart (1969, p.74) also noted: "The hypnagogic state is by no means confined to the beginnings of nocturnal sleep: I would speculate that there are many times when we believe we are just 'thinking deeply' or 'concentrating' in which we momentarily slip into a hypnagogic state". Thus, the term 'hypnagogic' turns out to be a misnomer, unless by using it we mean to refer merely to one temporally defined occurrence of it in the 24 hour cycle. But its being mostly noticeable at that particular part of the day is only due to the fact that the psychophysical conditions preceding the onset of sleep happen to be the same as those required for the occurrence of Oneirosis, that is, sleep onset is highly conducive to the LEB and the pronounced appearance of the 'dreaming' state.

Because of its character of LEB and oneiric nature, hypnagogia not only contains all manner of dreams besides the REM type but also allows preconscious material to emerge and become registered in a wakeful or semi-wakeful consciousness. This observation has a number of important implications. To begin with, it gives us an insight into the nature and occurrence of hallucinations. As a colleague of Caldwell pointed out to him (Caldwell 1968, p.109; cited by Schacter 1976, p.464), experiencing hypnagogic imagery is the best way of hallucinating without LSD. More significantly, hypnagogia sheds light on the hallucinations occurring in schizophrenia and the type of mentation involved in their production.

Further, the manner in which preconscious material emerges as well as its form and content may tell us a great deal not only about the particular individual but also about the workings of the human mind in general. I have argued that the surfacing and fusing of a number of FsOR, apart from shedding light on both schizophrenic and creative mentation, it suggests a presence of a

more general 'paralogic' attitude of mind which may be active in a subdued manner all the time but surfaces during hypnagogia when the logic of wakefulness itself is subdued. At such times, as Alexander (1909, pp.615-616) noted, may appear "forms of mentation that are never 'in' consciousness" but which, according to Leaning (1925, pp.390-391), "originate in the penumbra of being which surrounds the limited field of consciousness". These may be "unnoticed impressions" or material that "struck the mind without its knowledge" (Maury 1878, pp.69 and 96). They may surface by some form of mediate association and thus appear unrelated to the subject's current line of thought. We may remind ourselves here of Maury's (1957, pp.165-6) example in which he responded to the speaker's question by the irrelevant comment "there is no tobacco in this place". As Maury explains, although neither the lecturer's question nor his own conscious thoughts had anything to do with tobacco, a grain of tobacco snuff irritating his nasal tissues had given rise to a train of unconscious thinking which resulted in his puzzling verbal response.

Germane to the above are Prince's (e.g., 1922) findings and arguments supporting the view that there is not one single unitary unconscious but rather numerous sub-conscious "systems" (ib., pp.189-190). McKellar (1979b, p.100) proposes that "the hypnagogic imager...functions as two systems. One part of him observes what the other part chooses to show him on his personal cinema screen". He, further, compares hypnagogia to the listening to a number of radio programmes at once: this, as we saw in the chapter on 'Creativity', may result in the crossing and fusing of a number of FsOR thus yielding remote and original associations. McKellar also makes reference to Hart's (1939) view of dissociation as "an affair of gearing, the various elements of mental machinery being organized into different functional systems by throwing in of the appropriate gear" (quoted by McKellar 1979b, p.101). The latter remark accords well with my argument that the LEB in hypnagogia is correlated with a

predominance of subcortical activity. That is, there is a change of "gear" from that of wakeful cortical logic to subcortical paralogical mentation. In this "special state of consciousness" (Lhermitte and Sigwald 1941) both the experiences and the logic employed are state-bound (e.g., Maury 1878, p.96; Prince 1898, p.545; McKellar 1979b, p.133), i.e., they are peculiar to hypnagogia, and they require the presence of the latter in order to emerge.

The peculiarity, and perhaps, singularity, of the hypnagogic logic has been pointed out on numerous occasions in this paper (see, e.g., chapters 12 and 13). Moreover, as a primarily dreaming state hypnagogia will also draw remarks specifically directed to sleep dreams in respect to the peculiarity of dream logic. Van Eeden (1969, pp.146-7) defined dreaming as "that state wherein bodily sensations, be they visceral, internal or peripheral, cannot penetrate to the mind directly, but only in the physical, nonspatial form of a symbol or an image". In reference to hypnagogia, Walter (1953, p.166) spoke of "a weakening of the significance" of the signals reaching consciousness. It was noted in earlier chapters that in hypnagogia sensory 'signals' tend to become transformed into images and that both images and their significance are related to stages of the state. Moreover, as various investigators pointed out, there is "a special facilitatory influence" (Ornitz et al 1967) in hypnagogia, that is, the latter is more sensitive to incoming stimuli than the waking state. In Prince's (1906) study of multiple personality, 'Sally' stated that a dreaming person "hears every sound". Green et al (1971a, p.6) reported that their yogi subject was accurately aware of the workers' activities in the EEG laboratory, in which he was being tested, while in deep sleep (his EEG was that of 4 cps rhythm).

Such data point, once more, both to the need to distinguish between sleeping and dreaming, taking a fresh look at whatever 'causal' relationship might exist between them, and to the need to view more carefully the attentional state of the individual in dreaming states. It

has already been argued that it is not the case that the function of dreams, whatever it turns out to be, is to protect sleep, but rather that the presence of sleep and sleepy states provides ideal conditions for the emergence into consciousness of dream material. Whether the individual concerned then experiences sleep dreams or conscious dreams this appears to be, to a considerable extent, a function of his ability to manipulate his own attentional state.

The relationship between sleep and dreaming expressed above, and supported by previous arguments, clearly argues against Freud's (1943, p.118) contention that "the function of dreams is to protect sleep", and shows that the relationship should be viewed in a reversed perspective. Further supporting my view, and strengthening my arguments for a switch to a different 'logic', is Bliss and Clark's (1962, p.106) conclusion that "the mental organization of dreams can best be seen as the way the ... mind works, under environmental and neurophysiological conditions different from the waking state, rather than as a means to protect sleep". This wise, the Freudian "censor" is also slain (!). That is, the presence of the censor implies the application of waking logic, the censor is logical - otherwise what would be the point of resorting to complex, regressive mentation to evade him: the censor does not understand oneiric 'logic', he functions only in terms of waking logic. But, if oneiric mentation is, as has been argued, older evolutionally than waking cortical mentation, then, as has also been argued, the former is always present unconsciously, becoming preconscious and registering in consciousness when the original conditions of absence or diminution of cortical consciousness are fulfilled, viz., during states of Oneirosis, e.g., hypnagogia, sleep dreams. It may, of course, make some sense to speak of the presence of a censor in wakefulness, but then it will simply be another way of saying that one is using logic, reason, or common sense. The point is that in a state of

Oneirosis a different type of mentation emerges which, in some form or another, pre-existed the appearance of any logical censor whose presence can only properly relate to waking logic.

This is not to deny, of course, that dream activity can ever be wish-fulfilling or that some dreams may constitute the mind's reaction in sleep to the experiences of the previous day, as Freudian psychoanalysis holds. However, wish-fulfilling dreams and those involved with the experiences of the previous day may constitute only one or two species of the wider genus of Oneirosis. As hypnagogia so clearly shows, dream imagery may refer to the present psychophysical state and mental preoccupations of a person (autosymbolic), contain solutions to problems, or point to future resolutions of present conflicts (anagogic).

Further, controlled manipulation of one's attentional state in hypnagogia may constitute the conscious turning of a hypnagogic experience into a full-blown dream in which the subject participates while retaining consciousness of the fact that he is dreaming (see, e.g., Hervé de St. Denis, 1867, p.257; Green and Green 1978, pp.132-3). In this state one's body is asleep while his mind is kept awake. Similar states of consciousness appear to be aimed at by Desoille (cited by de Becker 1968, pp.160-1) in his "waking dream" practices in which he guides his subject-patients into an ever deepening reverie. Desoille argues that not only is the psychological phenomenology of "waking dreams" very similar to that present in nocturnal dreams but also the physiology of the former strongly resembles that of the latter: he found, for instance, that, as with nocturnal dreams, his subjects showed lowering of rectal temperature, slowing down of respiration, and lowering of respiratory metabolism.

As we saw in the chapter on 'Psi', conditions of bodily sleep accompanied by dream awareness are often deliberately induced by occultists who wish to achieve conscious OOBES (e.g., Fox 1962, pp.126, 138).

Warcollier (1938, p.50) referred to telepathic images as

"dream images" and to the telepathic state as "conscious sleep" (ib. p.101). Occultists also appear to make use of incomplete hypnopompic awakenings for the purpose of acquiring consciousness in sleep. But this practice, as we have seen, is not strictly confined to this class of people. Descartes (de Becker 1968), for instance, appears to have made accidental but profound use of it. It occurred to him in 1619, when Descartes was 23 years old, during one night when, in a series of three dreams interrupted by wakings, he conceived his greatest discovery, namely, the unity of all the human sciences. As his biographer records, at the end of the third dream, but still asleep, Descartes, "wondering whether what he had seen was dream or vision, he not only decided while sleeping that it was a dream, but also interpreted it before sleep left him". Soon, however, "doubting whether he dreamt or meditated, he woke up without emotion and continued the interpretation of his dream on the same lines with his eyes open" (quoted by de Becker 1968, p.99: from Baillet 1901).

In regards to my relating hypnagogia to meditation, Bagchi and Wenger (1959, p.136) have remarked that the yogis they investigated seemed to be using the "attention-phenomenon" "to merge into and stabilize at a different level the 'indeterminate' awareness of the deep subcortical mechanism, the highest level of neural integration - the centrencephalon". In other words, these people were trying to achieve a sleepless state of wakeful dreaming. In the same vein, I argued earlier in this chapter that hypnagogia is a special state of consciousness and that its particular manipulation may, indeed, lead to retaining consciousness throughout sleep. Relevant to this is Maury's (1857, pp. 174-5) distinction of three forms of intelligence: instinctive, reflective, and automative-reflective. The last one he relates to dream mentation and points out that, like the first, it is characterized by a great measure of autonomy. It is relevant to the present discussion because it draws attention to the evolutionary potentialities of hypnagogia. Mentation in the latter has been repeatedly referred to as regressive. However, as I pointed out, this is better viewed not merely as regressive but as the return



of an adult to an ontogenetically older state with the added advantages of acquired psychological structures and experiences. It has also been argued above, and earlier in this paper, that one may learn to balance himself in hypnagogia thus becoming capable of accepting and enjoying experiences which emerge from substrata governed by different logics: one may learn to be rational and nonrational at the same time, i.e., learn to be simultaneously awake and dreaming.

This, as we saw in the chapter on 'Creativity', has implications in the facilitation of the creative process in as much as the latter "involves openness to preconscious elements" and the establishment of "an intuitive relationship with the preconscious" (Gowan 1975, p.313). Heard (Weil et al 1971, p.9) also noted that "to have truly original thought the mind must throw off its critical guard, its filtering censor. It must put itself in a state of depersonalization". An early form of depersonalization in hypnagogia is the loss of body schema. As Walter (1953, p.166) noted, "it is as though the whole body were being shut from mental view". Notably, Alexander (1909, p.636) remarked that the less the body awareness the greater the feeling of consciousness - but not self-consciousness which in fact diminishes to the point of dissolution (see e.g., van Dusen 1972) as the result of the LEB.

Thus, in hypnagogia one may straddle both sleep and wakefulness through wakeful dreaming. Such a state fulfills the functions both of sleep and dreaming. Facility in achieving this state implies, among other things, that the individual is capable of handling, to a considerable degree, those of his own mental processes which are generally thought to spring into action only in sleep (REM) dream for the purpose of releasing repressions (see Foulkes and Vogel 1965). It also implies that he is capable of distinguishing between his internal, imaginal world and his external, perceptual world - the reality status he ascribes to his imaginal world, however, during the unfolding of the events or at any other time is dependent both on his attentional state at that time and on his general

beliefs concerning the realms of imagination.

Furthermore, as argued in the previous chapter, hypnagogia acts as an anxiety reducer both for the stresses of wakefulness and sleep dreams. Besides its hypometabolic activities invoked to explain its anxiety reducing function, this latter is also achieved through the lack of mental and emotional conflict due to the occurrence of fascination. In a state of fascination there can be no conflict because monoideism prevails. The latter may take place under one or the other of two conditions: (a) the mind is engaged-absorbed in one idea to the exclusion of all others, (b) the mind is in such a receptive attitude that any idea (in an innumerable series) may engage its total interest. Natural hypnagogia is of the latter case, experimental psi and meditation are mostly of the former. However, in non-experimental, i.e., spontaneous, psi and meditation (meditative mood, brown study, etc.) as well as in experimental cases where monoideism is not deliberately sought but rather receptivity and blankness of mind (non-analytic attitude), monoideism occurs as a result of the second condition. From a study of cases of monoideism becomes clear that conflict is a species of activity that belongs to the genus of 'logic', 'analysis', and subject-object differentiation and that unconflictedness is an aspect of fascination: analysis and logical activity may be carried out in a state of fascination but this is always of the monoidetic kind, that is, it does not allow of the possibility of 'alternatives', it is a kind of cognition encountered in inspiration and intuition. It is also found in states of ecstasy and during intense emotional arousal. The latter may appear to argue against the evidence that the hypnagogic state of fascination is characterized by lack of affect. This contradiction may resolve itself if viewed in terms of West's (1962) theory of hallucinations and dreams in which it is argued that a hallucination (in our present terminology, fascination) occurs either under conditions of very low arousal and psychological withdrawal or by "jamming the circuit". The latter may also explain the presence of 7cps rhythm in the EEG of both hypnagogists and people in rage (Walter 1953; Watson 1978, pp.150-5).

Before closing I would like to draw attention to two more observations. The first concerns the type of hypnagogic image called 'perseverative' (McKellar 1957). This, as noted, is not an exact reproduction of a perception but rather a combination of many. It is, in a real sense, an abstract-general type of image resulting from a number of particulars, yet being represented by a particular image. Its further investigation in hypnagogia may throw light on the process of concept formation in general. As noted in the chapter on 'Creativity', usually when speaking of generic concepts we have a vague abstract notion of these 'entities' but when we are hard pressed for precision we may resort to a representative image. As Richardson (1969, p.124) noted, "it is not merely a physical object that can be represented in visual imagery but almost any subtlety of logical relationships". Could it be that perseverative hypnagogic imagery is an exemplification of the normal process of concept formation in general?

The second point relates to memory. It has been noted by various workers (e.g., Maury 1857, 1878; Lhermitte and Sigwald 1941; Kubie 1943; Warcollier 1948; Muldoon and Carrington 1965; Budzynski 1977; Green and Green 1978) that hypnagogia is highly conducive to the emergence of memories. Kubie (1943) made use of this fact to help his patients recover long-forgotten childhood memories. On the other hand, we are repeatedly reminded that hypnagogic experiences themselves are often difficult to remember, being fleeting and having no points d'appui (Alexander 1909). Typically, Oliver (1976, pp.2-3) remarks that "I do not remember later most of the dream-like hallucinated experiences even if I have reported them verbally". Moreover, as Ellis (1897), Slight (1924) and others noted, in hypnagogia are encountered various forms of paramnesia, e.g., *déjà vu*, *jamais vu*. On other occasions, as in "dream scintillations", one's memory may be severely blocked. Although I have not attempted a detailed analysis of these phenomena, I suggest that they are severally related to stages of hypnagogia, the middle stage being perhaps more conducive to remembering as it is characterized both by

a considerable degree of relaxation that would facilitate the surfacing of memories and a degree of wakefulness necessary for their conscious registering. As sleep approaches and the type of mentation alters more dramatically the rising of memory phenomena takes place in an atmosphere of an altered state of consciousness and their appearance carries an altered significance. This is not to deny that with training, as argued above, one could not learn to dredge to the surface long-forgotten, or even "unnoticed" memories while behaviourally and physiologically asleep. One main problem here is to learn to distinguish between the language of Oneirosis and the language of wakefulness.

The question of memory in hypnagogia is closely connected with the states of sleeping, waking and dreaming. If, as argued, with training a subject could put himself to sleep physiologically while remaining psychologically 'awake', either by retaining some form of reality testing or by achieving continuity of consciousness from waking to dreaming, i.e., by achieving a pronounced kind of double-consciousness, then it is more than likely that memory performance would be greatly enhanced both in respect to registering hypnagogic-dream events and to recovering long-forgotten experiences. Moreover, the achieving of such continuity of memory and double-awareness would act as criteria for the claim that one may be physiologically asleep while remaining psychologically awake. This hypothesis might appear closer to fact than speculation if one recalls what has been said about the relationship of sleeping to dreaming, namely, that the former merely provides the ideal conditions for the emergence of the latter and that these conditions can be provided by the state of hypnagogia (deep psychophysical relaxation, LEB, parasympathetic predominance, etc.) while the subject is still awake. As argued, hypnagogia can fulfill the roles of both sleeping and dreaming; in addition, its manipulation may provide the conditions both for attaining continuity of consciousness and memory as the subject moves from wakefulness to dreaming, and for the recovery of forgotten or "unnoticed" events.

In conclusion, three forms of implication may be pointed out as flowing from the discussions in this paper. The first type of implication, from which in fact flow the other two, rises out of my arguments identifying hypnagogic mentation as both 'old' and as a 'new' kind of logic. This view argues, in effect, that mind is not co-extensive with consciousness, the latter often being identified with self-consciousness, and rational, logical, or 'cortical' thinking. It has been shown in this paper that forms of complex mentation exist outside focal consciousness and that they can be brought to the attention of the individual during hypnagogia, when, as Poincaré (1978, p.88) put it in respect to his hypnagogic-creative experiences, "one is present at his own unconscious work". Thus, to paraphrase Descartes' cogito, one does not need to assert himself as a self-conscious entity in order to be able to say that he exists as mind. The undercurrent of unconscious-nonrational mental activity which can be brought to the surface in hypnagogia reveals psychological dimensions which need not, and perhaps should not, always be made to fit the evolutionally current mode of mentation encountered in the waking state, i.e., they should not always be interpreted according to cortical logic. As we have seen, these are more appropriately viewed from within their own framework without the assertive interference of the logic of wakefulness, a task ideally accomplished in hypnagogia which allows a person to be 'awake' enough to register the experience and yet confers on him the ability to both appreciate the phenomena in their own dimension and also see them, when applicable, as pertaining to the solution of problems or as references to his own state of mind and body. This position, then, views hypnagogia not merely as a regressive state but rather as a progressive one in which the bipolarity of conscious-nonconscious, rational-non-rational are brought to a synergetic relationship. This view I consider to be the main implication flowing from the evidence presented in this paper. From it flow the other two kinds of implication, namely those relating to the practical application of hypnagogia and those pointing

to future research.

Hypnagogia may be put to practical use in a variety of areas such as those of therapy in the physical, psychosomatic, and purely psychological fields, solving personal or abstract problems, gaining insight into one's psychological states. Specifically, because of its triple dimension of relaxation (physical, emotional, intellectual) it may be used with particular stress on one or the other of these components. For instance, it may be employed to combat high blood pressure and excessive secretions in the stomach that might cause or exacerbate ulcers: businessmen prone to such complaints may learn to take short hypnagogic 'naps' during the day. Psychosomatic illnesses, in general, may be treated in this way, and so can anxiety and neurotic and emotional disturbances. These can be effected either by combining hypnagogic relaxation with guided imagery and autogenic practices or by the use of the former on its own. That is, a person first learns to recognize the relaxed state of hypnagogia either by attending to it when it occurs naturally at sleep onset at night or by producing it by means of biofeedback training. Then, he recalls and reproduces at will during the day the feelings of emotional calm (lack of affect) abandonment, tolerance, acceptance and lack of anxiety invariably experienced during hypnagogia. The advantage this method has over similar ones already in clinical application is that one does not have to learn to do anything which he does not already know and practise: we all practise hypnagogia naturally and instinctively every day. All one needs to do is abstract hypnagogia from its nocturnal setting. A further application of this state would be to make use of its auto-suggestive element to bring about character changes and effect somatic, psychosomatic and psychological healing.

On another level, hypnagogia may be used to bring about intellectual disinhibition for the purposes of creativity and psychological growth. In respect to creativity, a person may learn to 'hypnagogize' thus allowing the emergence of new FsOR and their fusing into new combinations for the purpose of solving problems or arriving at new inventions.

On the other hand, hypnagogia opens up great vistas for internal exploration ranging from taking 'trips' for sheer enjoyment (they may be fantastic, outlandish and most original shows - and they certainly burn no holes in one's pocket!) to exploring one's internal space and psychological structures in soul-searching quests. Such journeys of interior familiarization should inevitably bring about psychological integration and growth. A further psychological gain, or perhaps a corollary of the process, might be the achieving of insights into the nature of, and relationships between, the internal 'psychological' and the external 'physical' realms - these might be mystical, philosophical, or scientific insights depending on the personality inclinations and training of a person. One other area in which hypnagogia might be put to practical use is that of education. Too much stress for too long has been placed on the converging 'blinkering' and 'filtering' kind of thinking. It would certainly be of psychological and intellectual benefit if school and college curricula included periods of guided hypnagogia for the express purpose of achieving the aims outlined in this paragraph, and for counter-balancing the restrictive effects of strictly rational, 'cortical', mentation.

The third kind of implication referred to above concerns future research directions. As with the second implication, that of practical applications of hypnagogia, the list of research possibilities to be pointed out below should not be taken as exhaustive, but only as what I consider to be direct and important implications of my arguments. To begin with, all the practical applications of hypnagogia noted above could constitute experimental confirmation or disconfirmation of aspects of my arguments. For instance, hypnagogia could be experimentally tested for its conduciveness to the production of scientific and artistic insights and the facilitation of personal problem solving. In fact, this particular argument has already been partially confirmed in experimental settings by, e.g., Green et al (1970, 1971a, 1971b, 1973, 1978) and Budzynski (1972, 1977). Another field that may constitute for hypnagogia an area for practical application and experimental

confirmation is that of hypnopaedia or sleep-learning. Positive results in this area would further confirm and strengthen the view that hypnagogia is characterized by psychological sensitivity and openness. A further area of research might be that of recovering long forgotten data and remembering material that never entered the focal consciousness of the subject. Although this is an area in which hypnosis is already being applied, it would be of extra benefit to the subject if carried out in hypnagogia both because in the latter the subject need not lose consciousness of the situation and also because its practice would most likely increase the facilitation and access to similar material.

This closely relates to another area of research, namely, that of retaining consciousness and memory throughout hypnagogia and in particular hypnagogic dreams. This, in fact, is one of the most important research implications of my arguments. Extending the existing evidence, future research may direct itself to finding more individuals who can demonstrate that they can put themselves to sleep (physiologically, that is) but remain psychologically 'awake' while participating in a dream, i.e. be aware that they are dreaming and retain the capacity to respond to their environment. This would, then, be further strengthened by controlled experiments in which subjects are trained to enter hypnagogia and turn it into a dream state without relinquishing consciousness of the situation and awareness that they are dreaming. Important observations to be made in these experiments would be in their effects on the subjects' sleeping and dreaming habits as a whole, and in particular whether the length of their customary sleep and dreams is shortened and whether their experimental training affects the nature of their spontaneous sleeping and dreaming, i.e., whether the latter turn into conscious experiences, and whether such effects are lasting.

Finally, to encapsulate the study programme of this paper, my task has been four-fold: First to carry out an analysis of the subject's cognitive-experiential state during hypnagogia. Second, to provide a comprehensive



conceptual framework for the varied phenomena of hypnagogia. Third, to carry out systematic analyses of the relationships between hypnagogia and other states, processes and experiences. Fourth, to investigate the function(s) of hypnagogia and gain understanding of its evolutionary significance. Without arrogantly asserting that I have completely fulfilled this task, I hope my efforts have gone some way to achieving it and that the paper as a whole has both contributed to human knowledge and has opened up avenues for further research.

## APPENDIX

This appended section is essentially an explanatory note concerning certain incidental observations I made in respect to the nature of hypnagogia and its relationship to psi and meditation, while I was investigating and experimenting with techniques relating to changes of consciousness. The relevant observations to be reported below form part of three wider collections of data gathered by means of three different methods. The first collection comprises interviews with psychics, the second consists of observations made at 'psychic development circles', and the third is made up of observations of, and reports from, two groups of people I instructed in progressive relaxation and self-reporting of subjective phenomena. It must be clearly pointed out at the outset that in many of these cases it was not specifically my intention at the time of collecting the data to investigate their occurrence in relation to hypnagogic phenomenology. Indeed, a great deal of data had been gathered before I began my research into hypnagogia.

In respect to my interviews with psychics these have been carried out over a period of several years: they range from informal talks to more formalized tape-recorded interviews guided by a pre-set questionnaire, and include responses of established mediums as well as of budding psychics. My purpose at the time was to gather information on the modus operandi of individuals said to be functioning in paranormal states of consciousness. When, however, I came eventually to relate this information to the phenomenology of hypnagogia I found many striking similarities. These are very much the same as those discussed in the chapter on 'Psi.'

Invariably, the psychics I spoke to referred to their

psi mental states as a 'switching off' of the analytic mind and a switching into a different channel or reality. As a rule they experience their physical surroundings as fading into the background, while the 'psychic' world becomes prominent. In the words of Northage : "I switch off entirely. I forget 'me' entirely. I cease to exist. I'm not there, only as a point of relaying. Physically I, as me, cease to exist. Psychologically too, I am not concerned with myself ... I can see people in the audience whom I know quite well, and fail to recognise them. I sort of lose that [the physical] into this [the psychic], you see. They are not exactly invisible but they don't register ... Everything physical, you see, becomes 'secondary". The medium appears to be functioning primarily in a psychic reality wherein he/she tends to lose body schema identification, but not sensation. As another medium, Joan McCleod, put it : "You lose consciousness of your body but your senses become sharper". McCleod, like all the other psychics I spoke to, stressed the brightness of colours in her psi imagery and the sense of reality experienced in a psi state. Likewise, she pointed out that in such states she becomes highly absorbed and yet detached, she enters what I would call a state <sup>of</sup> de-egotization wherein the current psychic activity presents itself with a force of reality and engages her interest, but her interest, although deep, is clearly impersonal. In the case of trance this absorbed-yet-detached attitude is particularly pronounced. Northage likened the state of trance to 'having gas at the dentist's: "I don't think you are wholly conscious with gas. You know what's going on, but you are not taking any part in it at all". Northage further reported that when having an OOBEE she experiences 'images' and 'convictions' which are related to herself, as opposed to those appearing during a demonstration, which are always related to other people. She recounted to me three hypnopompic experiences

which she clearly considered paranormal, one of which seems to constitute a form of 'reversed' auto-symbolism, that is, an experience containing a verbal explanation of its contents : "I woke up feeling very refreshed and I was thinking to myself, 'Oh, what a lovely night I've had,' and was sort of slipping back into consciousness when a man's voice said : 'Death is as simple as that' - as if he were answering and explaining the lovely state I was in".

In regards to the phenomena reported in 'development circles' these are practically impossible to distinguish from the phenomena of hypnagogia. As in the case of my interviews with psychics, my attending numerous 'development circles' was connected with my interest in gaining information - and, in this case, first hand experience - of the way one operates in a psi state. A psychic 'development circle' is made up of a group of people - ranging in number from half a dozen to two dozen - meeting regularly - usually once a week - under the leadership of a psychic, who instructs them on how to enter and function in a psi state. The instructions and exercises vary from one circle to another and from one leader to the next. Basically, however, the members of the group are asked to sit relaxedly in a semi-darkened room and 'let go' or 'open up'. Although one is not asked specifically to close one's eyes, this is nearly always done as a means of aiding psychophysical withdrawal. Thus, in the early stages of psychic development, a person sits comfortably in a darkened room, lets go of his hold on the surrounding reality, turns inward, and waits. In spiritualist 'development circles' the 'waiting' is specifically characterized as the period during which the developing psychic is gradually making contact with the 'spirit world', that is, by relaxing and 'letting go' (becoming passive-receptive) he places himself in a psychological state conducive to affecting communication

with entities believed to inhabit a spiritual world. Thus phenomena experienced in this state are often interpreted as 'messages' from spirits.

Now, as already pointed out in the main body of this paper if a person sits comfortably in a darkened room, closes his eyes and lets go, the chances are he will fall asleep. This is particularly the case when he is instructed to 'blank' his mind, that is, to stop thinking, analysing, worrying, or concerning himself with everyday claptrap. In such circumstances all the known hypnagogic phenomena are abundantly demonstrated. My notes abound with reports of body schema alterations (shrinking, expanding, floating, numbness, facial distortions), total body schema loss, sensations of cold and heat, the hearing of names, isolated words, apparently irrelevant sentences, intuitions, solutions to one's own or someone else's problems. The visions include the seeing of isolated symbolic figures and signs, seascapes, landscapes, faces, fragmented or complete scenes - indeed practically all the hypnagogic sensori-motor phenomena discussed in the main body of this paper. However, given the psychological set of developing psychics and the setting in which such experiences transpire, the latter are invariably interpreted either as signs that the psychic is making progress in his development or as messages from spirit communicators. This is not to deny that meaningful and significant psi results are never obtained in these circumstances, but merely to note the occurrence of certain phenomena irrespective of set and setting.

In parallel with my research above I began holding my own two-hour weekly evening group meetings which were not spiritualistic in character and included meditation and visualization exercises. They were held at London's Holloway and Islington Adult Education Institutes and were designed to experiment with techniques of consciousness expansion and introspection. Although these classes ran

for four academic years - with mostly different people every year - data have been collected methodically from only two 30 week academic periods with two different groups of twenty persons each.

In these meetings all exercises and experiments were invariably preceded by psychophysical relaxation. This was carried out in semi-darkness with the members of the group sitting relaxedly on chairs or lying on the floor and listening to my instructions on relaxation delivered against a background of specially composed music. The relaxation period was then followed by either opening-up or concentrative meditation. Opening-up meditation consists basically of relaxing, letting go, and attending diffusedly to one's external or internal space. Concentrative meditation goes a step further than the previous kind in that attention is concentrated (in the diffused manner already discussed in this paper) on a particular external object, sensation or mental image. Traditionally, the opening-up meditation is employed either as a 'blinking' technique for its own sake, i.e. as a means of allowing one's inner, intuitive nature to come to the fore, or as a pre-condition to the exercise of concentrative meditation. In my classes these two forms of meditation were practised separately.

The instructions in respect to the opening-up meditation were to the effect of relaxing, letting go of one's concerns, ceasing to calculate and analyse, turning inwards, and becoming effortlessly aware of any subjective psychophysical occurrences, eg. physical sensations, images quality of thought, intuitions. It can be readily seen that these instructions, if followed dilligently, would lead into a state identical to that aimed at in 'development circles', the only characteristic distinguishing the two states being that of set and setting. Moreover, it can also be seen that psycho-physical relaxation (muscular, emotional, and

intellectual), letting go, turning inwards (psychologically withdrawing), are symptoms of spontaneously occurring hypnagogia - small wonder that I heard snoring on occasion, both in my own classes and in 'development circles'! Subjective phenomena reported as occurring in this type of meditation fell well within the phenomenological span of hypnagogia and, allowing for the absence of a spiritualist setting, they were indistinguishable from those reported in 'development circles'.

In respect to concentrative meditation this took the form of concentrating one's non-analytic attention either on a sensation (eg. listening to the meditation music as if the latter were being played in the centre of one's head) or a mental image (visual, auditory, kinesthetic, tactile, olfactory). Some relevant observations reported in this area include the following : On centring the hearing of music in one's head (internalising, subjectifying) the sense of hearing became extremely - almost painfully - acute; the musical notes were felt somatically, as if the music were literally played in one's head or body. Concentrating on a mental image, eg. an open red rose, often gave rise to visually related images, eg. a rosebud, a withered rose, a row of flowering plants on a windowsill. This did not seem to be the result of mental association but either grew out of the initial association, ie. the open red rose, as though organically, or sprang forth directly and in vivid form from the very attempt to visualize an open red rose. Concentrative meditation facilitated introspection in two ways. First, it enhanced a person's familiarization with his internal space, and second, it enhanced his ability to control and manipulate not only his mental imagery but also his attentional state itself. These benefits reflected, within a few weeks of practice, in the reports of experiences during opening-up meditation. That is, opening-up meditation became richer in imagery (or, rather, one became aware of more imagery in this state), and one's ability at attaining and prolonging

the state was enhanced.

Now, given the conditions and phenomenology of the opening-up meditation, the only criteria for distinguishing it from the spontaneously occurring hypnagogia are its deliberate induction and its prevention from leading to sleep - but these criteria, as argued in the main body of this paper, cannot be invoked to distinguish the experimentally induced hypnagogia from a number of adjacent states including meditation. Thus, in the exercises carried out in the evening classes, the opening-up meditation turned out to be a sustained hypnagogia in which a subject learned to balance himself between waking and sleeping and, in time, acquired the ability to report his experiences while the latter were in progress. This simultaneous reporting proved to have two advantages over the earlier routine of reporting after the experience had taken place, that is, at the conclusion of the exercise. First, it secured against forgetting the experiences themselves which was observed to be sometimes the case with the earlier routine, due mainly to the fascination and absorption experienced by subjects that prevented them from registering and remembering the experiences. Second, it secured against loss of awareness of surroundings and thus prevented a subject from falling asleep. Although this form of hypnagogic introspection initially led to a diminution in reported imagery frequency and vividness, as some subjects gradually became proficient in retaining double-consciousness (always remaining receptive and favouring the imaginal as opposed to the physical), their imaginal activities increased in amount, frequency and vividness, their relaxation deepened, and their ability to register hypnagogic phenomena was enhanced. Also noteworthy were the observations that the greater the amount and the more vivid the experiences one had, the more refreshed and invigorated one felt and the deeper one's relaxation.



Thus, psychophysical relaxation was found to be not only a pre-condition for the occurrence of hypnagogia but also to be directly affected by the latter in a positive way, i.e. hypnagogic experiences deepened one's relaxation. These observations bear strongly on my arguments in respect to the hypometabolic or anabolic function of hypnagogia and the employment of this state as a means of generation and immediate interpretation of dream imagery while the subject retains awareness of his physical surroundings.

Finally, some reports of members of these groups appear to raise certain ontological and epistemological questions. It is true that my approach in this paper has been a naturalistic one which has led me to first argue that many phenomena reported in a number of states are essentially hypnagogic and second that hypnagogic phenomena are correlated with activities of subcortical structures. Thus, I have argued that many so-called paranormal experiences are natural imaginal phenomena coloured by set and setting and that when they are reported as occurring in hypnagogia, they may be explained in terms of the operation of unconscious layers of one's mind and that hypnagogia is capable of 'catching' these operations and their effects because of its pre-conscious nature. This, however, does not explain why a person's hypnagogic experiences should sometimes constitute meaningful references to unknown, and unknowable by means of inference, aspects of the lives of other people. For instance, in the light of my experience with the phenomena of 'development circles' I asked my subjects in opening-up meditation to pose certain mental questions to themselves while experiencing hypnagogic imagery : they were to ask questions such as 'What does this image mean?', 'Who is it for?' Conversely they were asked to concentrate diffusedly on one or other member of the group while drifting into hypnagogia. Some results were striking examples of clairvoyance and telepathy. This

at least raises the question as to whether some seemingly 'irrelevant' hypnagogic images might not be meaningful phenomena belonging to the unconscious layers of another mind. Since, however, these reports were not properly quantified, I shall leave them as pointers and possible future research orientations.

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