

Herbert V. Guenther

The emergence of the Mahāyāna form of Buddhism marks, however strange it may sound, a return to experience from which ultimately all questions about meaning derive. In this respect it was not different from the earlier form of Hīnayāna which, however, tended to place its emphasis on the historical person who by his own efforts had reached a state unlikely to be attained by any other mortal. As *bhagavān* he possessed the six rare qualities of lordliness, valour, fame, fortune, knowledge and detachment which, in terms of art, could easily be articulated in physical and mundane terms. Yet, the decisive point had been experience. This had singled out a historical person, had changed him from an ordinary person into one who had become awakened (*buddha*), and lifted him above mankind without destroying his humanity. The state of being awake, technically known as *bodhi*, could be reached in stages alone, through different intermediary and subordinate states of being, none of which could be demonstrated tangibly. In terms of art, this shift from the historical person to an inward experience, from mundane display to spiritual qualities, became a difficult task which yet initiated an unbelievably rich development, in which the Indian artists succeeded immensely. 'The inwardness of the half-closed eyes, the soft and steady curves of the eyes and the eye-brows, the full and warm lips and the smooth roundity of form all over, go to underline that here is an image revealing an inner experience of purity and compassion, of transparency and immaculateness which are all in one interpretation or the other, the attribute of *bodhi* and of the Buddha', says Niharranjan Ray.¹ He goes on to say about the Buddha-Bodhisattva figures: 'To stand in front of one of these images and observe it for a while with an intent gaze, is to be perpetually convinced of the presence before one's eyes of a state of being which is illumined from within, shining in the radiation of the light of *prajñā*, melting in infinite *karuṇā* and yet immersed deep within itself, withdrawn altogether from the visible world outside and enjoying the beatitude of ineffable bliss which is the ideal state of being a *yogī*. Here is indeed the fulfilment in concrete visual terms, of the evolved idea of *bodhi* and its embodiment in the Buddha image.'²

Inasmuch as *bodhi* was conceived of as a state of being, however sublime, the danger was to see in it something static and to deal with it in ontic terms. This certainly happened with the presentation of the numerous Bodhisattvas, each of them exemplifying a state of being that could be found within the immensity of experience which became con-

gealed, as it were, in these images. The ontic character is well expressed by the term *bodhisattva* in which, from a Sanskrit point of view, *sattva* is both a state and a 'sentient being' representing a certain state of being. In this respect a certain tautology is involved: a state (*bodhi*) is a state (*sattva*). However, experience as experience is a 'dynamic field', not 'a juxtaposition of discrete elements' which 'are assumed to be scrambled or wholly disconnected, passively presented to an experiencer who then has the burden of arranging them into some kind of conceptual unity.'³

When the Indian Buddhist key-terms were rendered into Tibetan, the Tibetans recognized the dynamic character of experience and dealt with these terms hermeneutically. The emphasis, on their part, therefore, has always been on 'understanding' which is a participating in ever new and fresh ways to fathom 'what it means to be', rather than a standing aloof in splendid subjectivity and merely perceiving dead 'objects' which do not mean anything.⁴

The Sanskrit term *bodhisattva* which could be rendered as 'highest-state-of-intelligence-cum-a-being', is in Tibetan *byang-chub sems-dpa'* which, unlike the Sanskrit term with its rather 'static' content—a being *sattva*—is 'thoroughly dynamic in its emphasis on the operation of what for want of a better term we may call 'mind' (*sems*).⁵ This alone already shows the tremendous difference between the two concepts, a difference that has been deliberately ignored by Western writers (and their Eastern imitators) on Buddhism.

It is the hermeneutical explication of the Indian term *bodhisattva* in its Tibetan rendering *byang-chub sems-dpa'* that has remained dominant in Tibetan thinking and any reference to the Indian original is little more than a polite acknowledgement of the fact that India stimulated the Tibetan thinkers who continued thinking in Tibetan (*not* Sanskrit) terms. One of the earliest summary explications of *byang-chub sems-dpa'* is given by Rong-zom Chos-kyi bzang-po (11th century). In his commentary on the *Man-ngag Ita-ba'i phreng-ba*, attributed to no lesser person than Padmasambhava (8th century), he states:⁶

As to the term *byang-chub sems-dpa'*, *byang-chub* renders *bodhi*. This term has been coined in view of the fact that what it connotes is the ultimate abolishment of all impurities and the (resultant) transparent purity as well as a correct understanding and comprehending. *sems-dpa'* renders *sattva*. (This term) means 'desire', 'courage', 'a firm and unbending intention', 'having a mind', 'intellectual acumen', and 'summary'. In the context here it is used in the sense of 'desiring limpid clearness'⁷ or 'to be firmly resolved (to realize) limpid clearness' or 'limpid clearness' (itself) and 'having a mind (for it)'. As has been stated:

byang-chub (limpid clearness) has the characteristics of the clear sky;

All divisive concepts have been dispersed.

He who desires to understand this

Is called a *byang-chub sems-dpa'*.

Also, in the *Shes-rab-kyi pha-rol-tu-phyin-pa* (Prajñā-pāramitā literature) it has been stated that

Since someone who has the mind (for limpid clearness) will have realized limpid clearness, he is spoken of as a *byang-chub sems-dpa'*.

In this sense 'to have a mind (for limpid clearness) is to understand it as this limpid clearness. Furthermore, there also is the compound *byang-chub sems-can*. Here *sems-can* ('having a mind') means an animated being. Therefore, any animated being who has a mind for limpid clearness, is termed a *byang-chub sems-dpa'*. This mind of limpid clearness is, in brief, the combination of appreciative discrimination and compassion.

Similarly, in his commentary on the *gSang-ba snying-po*, Rong-zom Chos-kyi bzang-po declares:⁸

As to the term *bodhicitta*, *bodhi* is (short for) *avabodhi*⁹ which is the word for 'comprehending and understanding'. Since *bodhi* is also used in the sense of cleansing moral defects and restoring the initial transparent quality, one speaks (of him who does so as) *byang-chub sems-dpa'*.

sattva has six connotations: 'courage', that is the rousing of an inclination, 'valour and firmness'; 'aspiration', 'intellectual acumen'; 'an animated being'; and 'summary'. Since in this context there is involved a firm and unbending intention (to realize) limpid clearness there is the 'desire (to realize) limpid clearness; and since there is a reference to (this) limpid clearness and to someone who has the mind for it, one speaks of *byang-chub sems-dpa'*.

In this interpretation of *byang-chub* which Rong-zom Chos-kyi bzang-po takes as a unit, he carries on and even presupposes the earlier analysis of this term into its two components of *byang* and *chub*. One of the earliest interpretations is found in the *bDe-ba chen-po byang-chub-kyi sems rmad-du byung-ba'i le'u*, as preserved in the version of Vairocana (8th century):¹⁰

Here, *byang-ba* means that all that is and has come from me has been for ever free from the impurity of emotions; *chub* means that the past, the future, and the present, as well as all the countless realms of the trichiliocosm are identical, and since there is not so much as an atom apart from the (triad of) *sku*, *gsung*, *thugs*,¹¹ to understand all that is as being indivisible, is (to have realized) *byang-chub*.

Similarly, in another text, the *Byang-chub-kyi sems rmad-du byung-ba*, it is stated:¹²

byang-ba means to have been pure (refined) of any obscurations and the tendencies toward them from the very beginning: just as a crystal put into the palm of one's hand; the mind and the realms are certainly pure and lustrous since the pristine cognitiveness which

in one moment knows all three world spheres, the three aspects of time, and the three life-worlds, never ceases (to know). *chub-pa* means that just as oil pervades the sesame seed, everything that is is (this) quintessence. Since (this) all-pervasive energy (which is the very meaning of Being) which just is, is the birthplace of the (experience of) 'gestalt' (as founding stratum) and pristine cognitiveness (as the founded), (one speaks of *chub-pa*). *sems* means that since it has turned into understanding pristine cognitiveness as the ground of everything it has not been adulterated in its continuum or mystery (of Being).

The *Rig-pa rang-shar chen-po'i rgyud*¹³ understands *byang-chub sems-dpa'* as the triad of *chos-sku*, *longs-sku*, and *sprul-sku*¹⁴—all of which are 'virtual' processes in their formation as 'gestalt'-structures, reaching into the concrete life of a person—:

byang is the limpidness of *chos-sku*;

chub is the consummateness of the five *longs-sku*;

sems-dpa' is the working for others through *sprul-sku*.

(their activity) *mdzad-pa* presences itself as pristine cognitiveness.

Lastly, the *bKa' thang sde-linga*, one of the *gter-ma* or 'concealed works', which was rediscovered by O-rgyan gling-pa (born 1323 at Yar-rje in Grwa-nang), continues the hermeneutical tradition and explicates *byang-chub sems-dpa'* as:¹⁵

All emotions have been purified (refined *byang*); the (meaning of) pristine cognitiveness has been comprehended (*chub*); and thinking about (*sems*) others, (implies that) there is in it heroic (activity (*dpa'*)).

It is now obvious that the technical term *byang-chub sems-dpa'* refers to psychological or, if one prefers, spiritual processes, not to concrete entities, be these persons or things, in a purely mundane setting. This spiritual character is also evident from the 'names' which have been given to these forces, none of them being in any way a name one would give a concrete human person. A further indication that spiritual operations are involved is presented by their qualification as *nye-sras*. This term indicates closeness to the (Buddha-) experience (*sangs-rgyas*). The term *sangs-rgyas* is synonymous with *byang-chub*,¹⁶ and is explicated as 'the sleep of unknowing having disappeared and the mind expanded (opened) to all that can be known'.¹⁷ In attempting to 'picture' what is involved one resorts to a situation which is well-known because of the closeness it illustrates. Just as direct children inherit the property of their parents, so the *nye-sras*—'close sons'—inherit the wealth of their parents—the intentional structure of the Buddha-experience 'pictured' as the unity of masculinity and femininity (*yab-yum*)—and build with their inheritances an action-sphere of their own. This feature underlies the social contextual character of experience.¹⁸

Traditionally there have been eight *nye-sras*¹⁹ 'functionaries', 'executives' as we might say, and from among them 'Jam-dpal gzhon-nu(r gyur-pa), Mañjuśrī kumāra (bhūta) as he is known in his Sanskrit appellation, has been the most important one, so much more so as he represents Buddha-knowledge in its highest form.

This knowledge has an ontological, not an ontic character and to use Heidegger's diction it means 'to think Being without regard to its being grounded in terms of beings',²⁰ and 'first, we shall think Being in order to think It itself in its own element'.²¹ This intimacy, if not identity, of Being and thinking as thinking (not as some sort of thinking of or about some *thing*), but a continuous 'presencing', and in this presencing 'knowledge' (thinking as thinking) is pervasively inherent, not an external (or extraneous) agency. Characteristic of rDzogs-chen philosophy is its 'triadic' approach. It discusses 'Being' (the 'ground' which is not itself grounded in or on something other) in terms of 'pure fact' (*ngo-bo*), 'actuality' (*rang-bzhin*) (which does not 'happen' but just is) and responsiveness (*thugs-rje*) which as 'cognition' is a more 'excited' state and hence in terms of qualification is 'excitatory' (*rig-pa*),²² just as 'pure fact' is 'open', 'vacuous' (*stong-pa*) and 'actuality' is 'lucent', 'radiant' (*gsal-ba*). With its conception of 'pure fact' and 'actuality', the one as open dimensionality, prior to any and every form of judgment and also immune to it, 'nothing' or 'vacuous' for all practical purposes, without being a hypothetized 'nothingness' (or 'emptiness' for that matter) of rational thought, the other 'diaphanous', 'lucent', 'radiant', one is reminded of Nernst's discovery of 'zero point energy' which states that microphysical particles are still vibrating when, according to the kinetic theory of matter, they should be completely at rest, and of de Broglie's waves whose oscillations can hardly be interpreted as vibratory displacements of corpuscular entities. In addition, the statement that these two facets 'pure fact and 'actuality' are indivisible, makes us think, by way of analogy, of the vacuum field and its fluctuations. That all this is 'intelligent', 'cognitive', 'excitatory', as is affirmed by the inclusion of 'responsiveness', anticipates the search for 'hidden variables' in modern physics and suggests a unitary conception of life and the universe. These qualifications can well serve as a basis for an interpretation of the human situation, by being valid in physical, biological, social and spiritual domains simultaneously.

Inasmuch as the various *byang-chub sems-dpa'* are presences, not so much presences of some thing, but just presences having an open field character, it is possible to interpret them hermeneutically in terms of rDzogs-chen ideas. Such an interpretation of 'Jam-dpal gzhon-nu, Mañjuśrīkumāra, has been given by rDo-grub-chen 'Jigs-med bstan-pa'i nyi-ma (1865-1923).²³

jam-pa stands for the pure fact of Being, transparently pure from its beginningless beginning onwards. This has been free, since time before time, from the eight limitations that are set up by proposi-

tions such as that the very nature of all and everything that is, is such that it comes into existence, ceases to exist, is something eternally existing or something eternally non-existing, comes from somewhere, goes somewhere, is one and the same, or is different. Since (pure facticity) encompasses everything from (perceptible) colour-form to the perception (of anything perceptible) without its range being broken up or becoming fragmentized, it has not so much as an atom about it that could be posited as something. While (this facticity) has nothing about it to (make us speak of it as) coming into existence or being there in a concrete manner, even the label 'not coming into existence' is pointless and, therefore, (pure facticity) is beyond the conventional analysis of the cognitive process in terms of the cognitive capacity, of its addressing its (object), and its cognitive identity with it. It is free from (anything that could be considered as) the substratum for the various experientially initiated tendencies of experience, as the substratum for the live body initiated by and initiating these tendencies, and from what is the (complex of) mind and mental events which ranges over the three worlds, (having their root in) the loss of pure perceptivity. Although the straying away (from pure facticity) happens through the inherent dynamics (of Being), (Being itself) is not affected by the impurity which constitutes this straying away. The latter is like clouds appearing in the sky, without the sky being vitiated by them. This continuum which has no ground or root (other than itself) is not something rough to touch, and hence it is 'gentle' (*jam-pa*).

dpal stands for the actuality (of Being) which just is and is there. It need not be searched for somewhere else nor has it to be newly proved; it has been complete in its (being) an ocean of 'gestalt'—structures and pristine cognitions.²⁴ Even when its presencing is tarnished, in itself it remains ultimate pristine cognitiveness (rooted in and tending towards) limpid clearness and consummate perspicacity. Regardless of whether it becomes clouded-over by (the movement) of straying-away or (regains) the transparency (where) the straying-away movement (is resolved), its facticity does not turn good or bad. As to its manner of presencing:—when it does so as spirituality, there arises compassion towards sentient beings; when it does so as lucency there is the radiancy of its rays in the light of five pristine cognitions; when it does so as pristine cognitiveness, it stays in its optimal excitatoriness in which the impurity of (what constitutes the ordinary) mind has been removed; when it does so as 'gestalt', its brilliant lucency as a divine shape fills the whole sky; when it does so as non-duality it does not entertain beliefs in one-and-the-sameness or difference; when it does so as freed from limitations, the pristine cognitiveness which (is Being as) ground and complete, presences itself in its own lustre; when it does so as

transparency which is pristine cognitiveness, the presence of Nirvana does not come to an end; when it does so as obtuseness which is Samsara, the presence of the six kinds of being is there as if (they were) a magic show. This ground (of ours) which is a precious being-there, having become the reason (ground) for the (above) eight varieties of presencing is the very ground (or reason) for the qualities of freedom, and hence it is termed 'wealth' (*dpal*).

gzhon-nu stands for the fact that although the storm of karmic motility which is the source of mind as vitiated (by its emotional taints) rages over and around it, like a cloth (wrapped round and) covering a jar, (this storm) does not actually enter the very core (of Being), and this core is a deathless perpetuity, a solidity without any illness, exempt of aging and other frailties; it is youth beyond the momentary changes (of ordinary life). Since it has become the aggregate of endless superb qualities such as the (Buddha-) powers and qualities, it is a pattern or 'gestalt'. This 'gestalt' which is an (inexhaustible) reservoir of youth, is the unity of facticity (transparently pure from the very beginning) and actuality (the just-is).

Having interpreted Jam-dpal *gzhon-nu* (Mañjuśrīkumāra) as 'ground (*gzhi*) in its double connotation of persistent presence of Being (in being, in all that is) and reason for searching for it, rDo-grub-chen 'Jigs-med bstan-pa'i nyi-ma then explicates 'Jam-dpal *gzhon-nu* in terms of 'path' (*lam*) which is the unfolding of man's inner potential, and of 'goal' (*bras-bu*) which acts as the guiding principle or, as we would say nowadays, the hidden 'folded-up'²⁵ order in the evolutionary process. After all, as has been pointed out, 'intelligence', 'cognitiveness', 'spirituality' or whatever other term we may choose, is inherent in the universe which, for this reason, turns out more and more to be a self-organizing system, albeit an open one (*stong-pa* in Tibetan Buddhist terminology).

The hermeneutical tradition which has been kept alive since it started with the acceptance and spread of Buddhist ideas, by the followers of the rNying-ma school, is certainly one of the most significant features of Buddhism in the general history of its ideas.

University of Saskatchewan

Footnotes

- 1 Niharranjan Ray, *Idea and Image in Indian Art*, , p. 36.
- 2 *ibid.*, p. 37.
- 3 Calvin O. Schrag, *Experience and Being*, pp. 17f.
- 4 See in particular Richard E. Palmer, *Hermeneutics*, pp. 242 ff on the nature and scope of hermeneutical experience.
- 5 It is unfortunate that our term 'mind' is so ill-defined and can be used in such a loose manner as to make it almost meaningless. The Tibetan term *sems*, by contrast, is clearly circumscribed. It refers to what occurs in the 'reflective-

thematic' phase of experience (see Calvin O. Schrag, *loc. cit.*, pp. 45-48, 90) and is marked off from the prereflective-nonthematic phase which is termed *rig-pa* or *ye-shes* (the latter being the 'operational' phase of the 'ontological' *rip-pa*). Similarly there is a distinction between *sems* and *sems-nyid*, indicative of the reflective-thematic and the prereflective-non-thematic. rNying-ma texts never tire of insisting on the difference between the thematic (*sems*, *id*, *rnam-shes*, *ma-rig-pa*, *'khrul-pa*) and the non-thematic (*ye-shes*, *rig-pa*, *sems-nyid*, *byan-chub-kyi sems*).

As will have been noted in the Tibetan term *byang-chub sems-dpa'* the compound *sems-dpa'* is used and not merely the single term *sems*. This term has found its hermeneutical interpretation (which was then simply presupposed whenever the term was used later on) in the *sNang-srid kha-sbyor bdud-rtsi bcud-thigs 'khor-Da thog-mtha' good-pa'i rgyud phyi-ma* (=rNying-ma'i rgyud-'bum, vol. 6), p. 27. Just as *byang-chub* is interpreted as *byang-* and *chub*, so also *sems-dpa'* is interpreted as *sems* and *dpa'*, each component having its distinct signification. This work is said to be the joint translation by Padmasambhava and sKa-ba dPal-brtsegs.

- 6 *Selected Writings (gsuñ thor-bu) of Roñ-zom Chos-kyi bzañ -po*, pp. 42f.
 7 'Limpid clearness' attempts to render in English the conception and association that the Tibetans had when they used the term *byang-chub*. The statement that this word corresponds to Sanskrit *bodhi* without discussing this term linguistically or even hermeneutically, is on the same level as stating that the English word 'lord' is derived from OE *hlaford* from *hlafweard*=breadkeeper, and then forgetting the present day usage. No sane person uses the term 'lord' nowadays in its Old-English connotation. Why should the Tibetans be made to think in Sanskrit terms so as to accommodate those who do not know Tibetan (and maybe not even Sanskrit properly)?
 8 fol.10b. See also fol. 56a.
 9 It cannot be decided in the absence of original manuscripts whether this term was used or whether it was coined by the editor who was familiar with the Sanskrit word *bodhi*. The Sanskrit dictionaries only list *avabodha* 'waking, becoming awake'; 'knowledge, perception'; 'discrimination, judgement'; 'teaching-informing'.
 10 rNying-ma'i rgyud-'bum, vol. 2 p. 12. For another lengthy hermeneutical interpretation see also the work quoted in note 5, pp. 26f.
 11 These difficult terms deserve a special study of their own. They refer to what we may call 'virtual' (in analogy with the 'virtual' and 'real' particles in physics) aspect and contrast markedly with the concrete ('real') entities of body (*lus*), speech (*ngag*) and mind (*gid*). While *lus* is tied to *sems* (synonymous with *gid*), *sku* is related to *ye-shes*, man's 'cognitiveness before it is channelled through categories of thought'. *ye-shes* is primarily ontological, not epistemological as is *rnam-shes* (*rnam-par shes-pa*).
 12 rNying-ma'i rgyud-'bum, vol. 2, p. 621; *The rGyud 'bum of Vairocana*, vol. 2, p. 168.
 13 *Rñin ma'i rgyud bcu bdun*. Collected Nyingmapa tantras of the Man nag sde class of the Atiyoga (rdzogs-chen) vol. 1 pp. 824 f.
 14 On these terms see my *Kindly Bent to Ease Us*, vol. 1, s.v.
 15 p. 740.
 16 See Klong-chen rab-'byams-pa's autocommentary on his *Sems-nyid ngal-gso*, p. 1033.
 17 *Gsañ snags nañ gi lam rim rgya cher 'grel-pa Sañs rgyas gnis pa'i dgoñs rgyan*. An exegesis of a rediscovered Nyingmapa *Lamrim* text by Kah thog Dge-rtse Pandita 'Gyur-med-tshe-dbang-mchog-grub, p. 13. A lengthy hermeneutical interpretation of *snags-rgyas* is also found in the *rDogs-pa chen-po nges-don 'dus-pa'i rgyud* (rNying-ma'i rgyud-'bum, vol. 7, pp. 69 f. See also pp. 291, 380 in this volume. An expanded version of this work is found in vol. 8,

- pp. 104-478).
- 18 On this feature of experience see Calvin O. Schrag, *loc. cit.* pp. 185 ff.
- 19 They are—to use their commonly known Sanskrit appellations—Mañjuśrī, Avalokiteśvara, Vajrapāṇi, Maitreya, Gaganagarbha, Kṣitigarbha, Sarvaṇīvaraṇaviṣkambhīn, and Samantabhadra. Their ‘histories’ have been compiled on the basis of Sūtra and Tantra texts by Mi-pham in his *Byang-chub sems-dpa’ chen-po nye-ba’i sras brgyad-kyi rtogs-brjod nor-bu’i phreng-ba* (Collected writings of ‘Jam-mgon’ Ju Mi-pham-rgya-mtsho, vol. 13, pp. 237-675).
- 20 *On Time and Being*, p. 2.
- 21 *ibid.* p. 5
- 22 *rig-pa* in its technical use points to a state of increased excitation which in a living organism is tied up with an intensified capacity to be ‘cognitive’, and with the phenomenon of lumination (‘we light up with pleasure’ and are more perceptive). By contrast, *ma-rig-pa* is not the absence of excitation and perceptivity, as may be falsely concluded from the negative particle *ma*. The term *ma-rig-pa* means ‘not-quite-*rig-pa*’, ‘not quite as perceptive as might be the case’. Absence of excitation and perceptivity, implied by the traditional (mis) translation of the Sanskrit equivalent *avidyā* by ‘ignorance’, would have been *rig-med*, not *ma-rig-pa*. Thus ‘*tshe-ba med-pa (ahimsa)* is the negation of violence and cruelty (*‘tshe-ba, hiṃsā*), not a mere lessening. From these instances which could be easily multiplied we can see that translating Buddhist texts needs more than looking up a word in a dictionary—it needs ‘understanding’ the subject-matter, the hermeneutical experience.
- 23 *rdzogs-chen*, fol. 1b ff. (= Collected Works, vol. 5, pp. 179 ff).
- 24 *ye-shes*, unlike its epistemological counterpart *shes-rab* ‘appreciative discrimination’, belonging to the complex of ‘mind and mental events’ (*sems* and *sems-byung*—as a matter of fact, *shes-rab* is a ‘mental event’ as anyone knows who has studied the *Abhidharmakośa*) and making up the ‘thematic’ phase of experience, is ontological: *ye* ‘from a beginningless beginning onwards’ and *shes* ‘cognitive’. On this hermeneutical interpretation, see for instance *rDogs-pa chen-po nges-don thams-cad ‘dus-pa ye-shes nam-mkha’ mnyam-pa’ i rgyud (=rNying-ma’i rgyud-‘bum, vol. 8)*, p. 385; *Rig-pa rang-shar chen-po’i rgyud (=Rnin ma’i rgyud bcu bdun. Collected Nyingma tantras of the Man ṅag sde class of the Atiyoga (rdzogs-chen), vol. 1, p. 451.*
- 25 This term has been coined by the British physicist David Bohm. See P.C.W. Davies, *Space and time in the modern universe*, pp. 194 ff.