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INDIVIDUALS, SYNGAMY AND THE ORIGIN OF HUMAN LIFE

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A REPLY TO BUCKLE AND DAWSON

Stephen Buckle and Karen Dawson of the Monash University Centre for Human Bioethics have written a sixteen-page article on "Individuals and Syngamy"[1] as an analysis of a paper produced by one of our working parties entitled "Identifying the Origin of Human Life"[2] Seeing that their work was funded by The National Health and Medical Research Council in a Special Initiative Grant to Professor J. Swan, Dr. J. Funder, Ms B. Gaze and Dr. H. Kuhse, (who all, presumably, consider its science, logic and philosophy sound, and a valuable contribution to research) it should not pass without comment.

Their analysis is not favourable. I quote in full the summary given in its "Conclusion":

Enough has been said to show the diversity and extent of the problems that the argument raises or leaves unanswered. The argument fails to establish that we have a new biological individual before syngamy, and in fact shifts from an argument about individuals to an argument about capacities. This is a shift of considerable consequence, not only because capacities of the relevant kind appear to exist before there is a new individual, but also because the argument, if it is not to be guilty of equivocation, must appeal to a workable and relevant version of the argument from potential. Whether such a version of this argument can be forthcoming remains to be seen.(p 30)

Let us restate these criticisms of our thought:

We do not prove that there is a new biological individual before syngamy.

After arguing that there is a single individual present after part of a sperm head has penetrated an ovum we argue that this individual has a particular set of capacities.

Capacities that indicate what sort of an individual is present exist before the individual itself exists.

Our argument seems to depend on using one word in two different senses.

A well-known argument, namely the argument from potential, which is not discussed here, might possibly be formulated in such a way as to overcome such dependence.

This final outline is welcome, as in the text the arguments are not clearly distinguished from one another and some are mentioned a number of times before being expounded.

It should be noted that the analysis is mainly in terms of words and logic. There is practically no scientific comment, and little if any new evidence introduced. The three footnotes refer to an earlier paper of ours, and a paper on the argument from potential - an argument which is not mentioned in our paper.

I propose to examine these five charges as outlined by the authors, though it will be convenient to take them in reverse order, as some of them depend on those that follow. Then, to clarify the issue, I will put aside their literary framework and consider simply the scientific evidence that they submit together with the conclusions they draw from it and the basic questions that arise in connection with such evidence. Readers who are interested only in the basic issues may find it sufficient to turn to page 6 of this paper.

THEIR FIFTH CRITICISM :
THE ARGUMENT FROM POTENTIAL

Their final criticism is that our argument "must appeal to a workable and relevant version of the argument from potential".(30)

They suggest that we **might** argue that

although these capacities [presumably "the capacity to develop into a being possessed of the distinctive human

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attributes (such as the abilities to doubt...)"] are not to be understood simply as personal attributes nevertheless we should treat the bearers of such capacities as if they did possess personal attributes (28)

It is said, however, that this argument

depends on an additional unstated (and problematic) argument,

the argument that

morally speaking, potentialities are just as weighty as actualities,(29)

an argument about which "much more needs to be done".

To reply briefly, two things need to be done - but by Buckle, Dawson and their sponsors. They must make a case to show

(i) how those original human capacities can develop into the "actualities" mentioned without any significant help from outside other than resources such as food and protection which have never succeeded in developing the embryonic capacities of a dog or a horse into such actualities, and

(ii) how the actualities themselves are required in the moral argument.

On this latter point, do the authors hold that it is immoral to kill a human being only if he or she is actually doubting, reasoning, enquiring, affirming, understanding, or loving? Do they insist that it would never be murder to kill a person who is asleep?

Their concern not to be seen as overthrowing accepted morality on this point might account for their previous use of the phrase "actual abilities" (29) instead of "actualities". But the word "ability", which is equivalent to "capacity", has slipped in here, so they are back with us in treating human capacities as a guide to what is truly human.

We do not retreat into an "as if" argument, and we are not touched by this fifth criticism or the paper by Singer and Dawson, because we do not make the concession that the capacity to develop **without significant discontinuity** (such as would constitute a "marker event") into an enquirer and affirmer is not the attribute of a person.

THEIR FOURTH CRITICISM :
EQUIVOCAL USE OF "CAPACITY"

The fourth criticism is that we are guilty of equivocation in our use of the word "capacity".

This had been mentioned as "the problematic employment of the notion of capacity" (24), and again as among "the problems implicit in the authors' use of the notion of capacity" (27). Our argument, which is said to depend "on an equivocal employment of the crucial notion of capacity" (28), is formulated by the authors thus:

the capacity to develop into a being possessed of the distinctive human attributes (such as the abilities "to doubt, reason,... understand, love, etc.") is itself a human capacity in just the way that these attributes are human capacities. Thus possession of these capacities qualifies a being as a person, because, like all persons, it possesses the capacities necessary to reason, understand, etc. (27-28)

The charge is that

There are... two senses in which the term 'capacity' is being used: in the former sense it means what some being can now do; in the latter it means what some being can, in the normal course of events or in appropriately favourable circumstances, come to be able to do. (29), my emphasis?

The charge is supported by the assertion that

such distinctively human capacities (are) not... activities that that individual can engage in. (29), (their emphasis)

This, however, is not true. It depends on the false supposition that an individual which develops by its own powers is not the same individual while developing. The authors make no effort to show that the early embryo is not the same individual as the adult that it grows into. If they made the attempt they would soon realize that their arguments would probably suggest that I am not the same individual today as I was yesterday. This is contrary not only to common sense but also to any justification we can have for using the word "individual" at all.

But, then, the authors confess an uncertainty in this area. According to them

it is difficult to determine just what counts as unification. What does a cell have to be like to be a unified entity? The mere fact of being a single cell is not enough.(22)

They repeat this later:

it is difficult to determine what constitutes unification in an unfamiliar, or incompletely understood, setting.(24)

So we would expect them to be arguing with rather less confidence than is shown above against unification of a single individual over a period of time.

The former statement, too, is just as weak. It does not indicate any difference in our use of the word "capacity" (nor any serious distinction between this and such words as "can" and "ability"). The distinction is simply, and explicitly, one of time.

If they insist that a distinction of time is relevant then the onus is on the authors to give some plausible scientific account of how there can be added to an embryo (or fetus or child) further significant capacities that do not depend on the capacities possessed by that embryo as soon as its unique genetic constitution had been determined. So far they, and others who argue like them, have completely failed to do so.

The different capacities of an adult human being and a dog can be ascribed to their different genetic constitutions. This difference is fully determined at the earliest embryonic stage. We are not equivocating.

Our statement that

a new human individual comes into existence when the process of the fusion of sperm and ovum results in a single unified entity which is so organized as to have the capacity to develop as the kind of being which would normally have that collection of attributes which we describe as human - especially the ability to doubt, reason, enquire, affirm, understand, love, etc. (54)

still holds.

THEIR THIRD CRITICISM :
CAPACITY AND EXISTENCE

The third criticism is based on the alleged fact that the capacities,which indicate what sort of individual is present, exist before that individual exists.

Regarding "the capacity to develop human characteristics" (23) the authors make a double claim:

(a) it (has) not been shown that only distinct individuals possess these capacities (23)

(b) it seems rather easy to show that the necessary capacities exist before there is a single individual.

The main evidence in support of this second claim is that

A motile sperm and an ovum, considered as a pair,

comprise a system which possesses these capacities prior to the sperm's penetrating the ovum. If the system thus identified did not possess at least some of these capacities, fertilization itself could not occur. (23)

This claim is also supported by a reminder that living beings are subject to death:

(c) (We do not) know that a sperm-penetrated ovum will successfully achieve syngamy, or cell-division, or implantation, etc. Early (sic) life is a hazardous and unpredictable affair. The possession of the relevant capacities is no guarantee of successful development, principally because the capacity to become a being of a certain kind is, in the usual case, only a necessary condition for becoming such a being. (23)

This likelihood of dying is said to be similar to the chance that a particular sperm will not penetrate the ovum:

We don't know whether or not the sperm will succeed in penetrating the ovum. (23)

This criticism seems to miss the point of the whole discussion. We are concerned with the beginning of a new human individual. We pointed out that each individual living thing must have a single unity of organization, so we excluded, on the one hand, any group of two or three distinct things, and, on the other hand, anything which is only a part of a larger organized individual.

We then argued at length that there is a single unity of organization in the zygote after penetration, and that it cannot be considered either as a group of two or three distinct things or as a mere part of some larger whole. We were also concerned with evidence that this single organized unity was of the sort that can truly be called human.

So to (a) we reply that we have been considering only distinct individuals, and have been asking when we have them and what makes them human. We are well aware that some of the capacities can be possessed collectively by a set of individuals. That is precisely why a marker event is important. It indicates when there is one full distinct individual with the required capacities as its own.

Our reply to (b) is that we have always accepted that many of the capacities can be distributed among **separate individuals** before there is a distinct individual which possesses them. That is why the moment when that single distinct individual commences to exist is so important. The authors concede this by talking about a system. But the suggestion that a sperm and an egg comprise a system is grossly misleading.

In reality there is an egg and at least fifty thousand sperm. Merely **considering** just one of these sperm together with the ovum "as a pair" does **not** identify "a system", still less anything that can be called "**the** system". Only expert human intervention, or a large number of random events culminating in the union of one sperm with the ovum, can initiate a single individual in which two appropriate distinct sets of capacities come together to constitute one individual. In either case the significant move is the penetration of the ovum by the contents of the head of one of those sperm.

As for (c), we agree that someone who has won a lottery can easily lose the winnings later. But we reject the view that each of fifty thousand people who entered the lottery has that same claim on the prize.

Our ignorance of "whether or not the (sic) sperm will succeed in penetrating the ovum", which they liken to our ignorance of whether any living being will stay alive in the face of the hazards of disease and death, is insignificant when compared to our massive ignorance as **which** of the thousands or millions of sperm we should be directing our attention to after semination.

Any facts about a sperm or an egg before fertilization do not in any way invalidate our argument that a new human life begins when an ovum is penetrated by the nucleic material from a sperm. Before that there is no new individual, no new life, and so there is nothing which possesses the relevant capacities.

It is true that an ovum possesses certain necessary capacities, with a life that can last up to 24 hours, and that a sperm also possesses certain necessary capacities, with a life that might last a few days, but the whole point of the search for "a marker event" that was conducted so assiduously by the Senate Select committee on Embryo Experimentation was to find when these capacities became sufficient to commence developing in a life that might last up to 80 years or more. It is perfectly clear that this occurs at fertilization, and not before.

Of course, the authors' claim that the sperm and egg as a system have the capacity to develop into a full human being is an admission that the egg **itself** simply does not have the capacity to so develop. And that the Sperm **by itself** does not have that capacity. So they should be able to recognize the difference between a partial capacity and the complete capacity of which we speak.

We claim that there is something missing - an event which brings the sperm and the egg together. Without coming together they do not have that complete capacity. The sperm lacks the full organizing power. The sperm and the egg separately, even if "considered as a system", lack the full organizing power. This is attained only when the sperm has penetrated the ovum and the whole set of events precipitated by this event start taking place.

On the other hand, the fertilized egg does possess the full organizing power. It needs nourishment and a suitable environment, and, if formed in vitro, it needs transfer to such an environment. But these are not part of the organizing power. They are external requirements. These are comparable to the similar needs of any adult animal for food and a suitable environment. The living being is the animal itself, not some combination of the animal and the paddock in which it is feeding.

We have said:

The crucial point for us is when the ovum and sperm gain the complete capacity to develop as a human individual and the process of the development of a human life begins.

This has nothing to do with the so-called "argument from capacity". We are not talking about a capacity to be a single living being. We are talking about a single living being (already constituted as such) with a capacity to develop as the sort of thing it already is. We are not here relying on the distinction between a capacity and its fulfilment. We are alluding to the distinction between a complete capacity and a mere part of that capacity, the simple distinction between a part and a whole.

The third criticism, therefore, is lacking in substance (intellectually as well as physically!).

THEIR SECOND CRITICISM : CAPACITY AND INDIVIDUALITY

The second of the five criticisms is perhaps the most intriguing:

The argument... in fact shifts from an argument about individuals to an argument about capacities. This is shift of considerable consequence.(30)

This cannot be referring to the charge of equivocating

on the word "capacities", as that is mentioned separately as the fourth criticism.

It seems, rather, to be referring back to two brief passages where the words "capacities" and "importance" occur, along with the word (or notion of) "shift", and a move on to the third charge.

The first of these passages reads:

Thirdly, and most importantly, the argument seeks to establish when a new human individual comes to exist, but the conclusion is centrally concerned with the existence of the capacity to develop human characteristics.(23)

This is the third of three reasons offered to show that we have not proved that the existence of

a single cell which has the capacity to develop all the important human features (22)
is the existence of a new human individual (22)

The authors explicitly admit that "there is such a cell" (22)

Their argument is spelt out a paragraph later:

The fact that pre-syngamy cells have the capacities necessary to develop into conscious human persons therefore does not serve to establish, or even to help to establish, that such cells are already new human individuals.(24)

This argument is logically faulty, in that its only support is the (obviously true) claim that

The fact that two entities share a common feature [or even many common features"] does not show that they are the same (23)

without any indication of some relevant feature which is not shared. Their phrase "**the** capacities necessary to develop into" (like their reference to "**all** the important human features") means more than "a capacity" or "**some** capacities". With the definite article it means "the capacities **sufficient** (as capacities) for developing into".

Even if the authors really did not mean to use this phrase of a pre-syngamy cell (though they effectively do so twice), they must go on to name some other factor necessary for conferring human individuality. It is because Peter Singer has not so far, over many years, named any such factor that I have had to come to the conclusion that he thinks of human origins as due to magic. The faulty shift here is not from individuality to capacities in our argument, but from "a common feature" to "the capacities" in theirs.

Their second passage on the shift occurs some pages later. Before moving on to their third and fourth criticisms they say:

It has already been suggested that the argument's concern with the capacities involves a shift from its stated concern with determining when a new human life begins.(27)

The main question here is how the authors themselves propose to determine when a new human life begins.

How is a human life to be distinguished from a plant life or an equine life without any reference to the the sorts of things that a plant, a horse or a human being can or cannot do? And how is the beginning of a new life (whether of a plant, a horse or a human being) to be marked without any reference to the time of completion of a set of powers which was previously incomplete? And without any indication of a cause of such completion?

The charge that we shift from a concern with the time when a new human life begins to a concern with capacities does not accord with our text. Right from the start of our article, and almost every time we state our position, we mention both of these **together.** There is simply no shift between arguments, still less any shift that might seem hidden or illogical.

In our fourth and sixth paragraphs we speak of "a single unified entity" (S4) with the appropriate capacity, and of

"a distinct entity with the capacity to develop as a human individual".(S6)

After outlining the scientific evidence we point out that at syngamy there exists

"a single unified entity which is so organized as to have the capacity to develop as the kind of being which has that collection of attributes which we describe as human", (S17)

using the same terms as in our fourth paragraph. We show then that the distinct entities that exist before the beginning of fertilization do not possess the required capacities because

"each needs to be fused with the other before further development can occur"(S19)

We thus converge on the main issue, noting that when the membranes fuse

"the ovum gains a capacity which it did not have while simply an ovum, that of developing as a human individual" (S20),

still speaking of individuality **along with** capacity, as we do also in the next paragraph:

a single cell containing many interacting components which by their interaction have the capacity for organizing all the subsequent stages of human development (S21)

A little later we say:

The crucial point for us is when the ovum and sperm gain the complete capacity to develop as a human individual (S23),

and we refer to the beginning of

a single living entity which has the organization which will bring about not only syngamy, but all the other developmental events of a human existence (S24)

speaking of the possession of such organization as a "capacity".

Finally, we speak of the cell's capacity for human development (S26) and contrast this with the lack of developmental capacity in a nucleus and the pronuclei unless they form part of a cell, that is, of an organized individual.

The strong, though vague, accusation, repeated many times, is neither based on what we have in fact said, nor alert to the real issues at stake.

THEIR FIRST CRITICISM :
AN INDIVIDUAL BEFORE SYNGAMY

So we finally turn to the first charge made in the final summary. It is said that our

argument fails to establish that we have a new biological individual before syngamy(30)

To answer this directly, of course, we would have to reproduce our whole paper, as it was aimed precisely at establishing this point. We refer our readers to it. Those who have seen only the Buckle-Dawson paper might be surprised at finding what we have really said. All we can do here is reply to specific criticisms.

The authors give three arguments on page 22 (the third of which we have already examined in detail as it contained the substance of their second charge), and then three or four less clearly defined arguments.

In the first place, they say (22),

Siamese twins with separate brains can be thought of as two distinct entities contained by a single body

and then (shifting the onus of proof):

Why should we not regard the male pronucleus as a distinct entity, albeit one wholly contained within another cell? (22)

They give no evidence why it should be so regarded, whereas we have already given our scientific evidence in our article. Briefly, no nucleus of any normal cell is regarded as a distinct entity. It serves and depends on the many organelles and other constituents in the cytoplasm. And in this case the indications are that the pronucleus is rather less active than the nucleus of a normal cell. Besides, it is the object of a good deal of organization within the cytoplasm, directed to providing it with a new nuclear membrane and moving it towards the other pronucleus. So there is no sign that the pronucleus is a single organizing entity. It is, rather, a part, along with many others, of a larger organized whole.

Secondly, it is said that we do not show that the cell has the necessary unity:

The fact that there is at this stage a single cell does not show that the cell has the necessary unity which the argument has previously accepted to be necessary for the existence of a new individual.... Is the pre-syngamy cell unified?... there is one sense (at least) in which the pre-syngamy cell is not unified....its genetic constituents are not unified. Genetically speaking it is still ***in the process of becoming*** *a unified individual, a process which will not be complete until syngamy.(22)*

This argument is weakened by the authors' admission that *it is difficult to determine just what counts as unification (22)* and by their failure to make any attempt to overcome this difficulty, or even to consider our solution to it.

We have pointed out that there is a positive sign of unity in organization, namely, a coordination of a large number of parts and of functions in a way that makes sense as directed to a single goal. Here the goal is the development of the initial single cell into a single adult organism.

It would, of course, be excessive to demand a degree of coordination greater than that in any adult who is recognized as being a single human being. So identifiable parts, like fingers, or even highly mobile components, like blood cells, are no bar to the unity of a genuinely individual thing. Multiplicity, as opposed to unity, is indicated only where there is no single overall intelligible focus, but two or more clear distinct and uncoordinated focuses, for the many events that take place and the many varied parts which contribute to these events.

When, a few pages later, the authors finally acknowledge that we have been basing our analysis on this notion of organization they show that they have failed to understand this notion. They say:

*the pre-syngamy cell is highly organized, ,****in the sense*** *that it has a complex structure. This is indeed true, but is quite distinct from the question of unity: the Siamese twins already referred to have a complex structure, and hence are organized* ***in this sense.*** *(24-25), emphasis mine)*

They ignore the **unity** in complexity that is essential to the notion of organization. And so they pass over the fact that Siamese twins with two heads have the two distinct and notable **unities** of organization involved in having two distinct brains. Mere complexity is not the only factor. They have clearly not thought of asking why it is that they are able with confidence to call the twins "separate persons".

Let us accept their specific challenge by applying this criterion to the genetic constituents. Even in late adulthood the individual chromosomes are never fused together, and never lose their maternal or paternal identity. On the other hand, the unique genetic constitution has already been determined at penetration (but not before penetration), and has been protected by the sealing of the membrane by the reactions due to the cortical granules. Various organelles (such as micro-tubules), which were not active in the ovum, have started operating in such a way as to bring the two sets of genetic material together and to enable them to reproduce themselves for the first of the large number of times required for producing as soon as possible an organ suitable for gathering nourishment. Any additional "completeness" of genetic constitution that is claimed at syngamy is quite minor compared to the completeness attained at sperm penetration and persisting at adulthood - and even right until death.

If the fact that some of the constitutents of a cell have not yet come together in the fullest way (23) is a sign that "the pre-syngamy cell is not unified", then no cell at all is ever unified, since every living cell contains some chemical molecules that have not yet reacted with each other to form a larger molecule in the way that they will later do. Their argument on this point is only one more sign that the authors have found it "difficult to determine just what counts as unification" (22), and have made no contribution to answering this question.

The first argument on page 24 seems to be very similar to that on page 22, based on Siamese twins, and on a distinction between a minimal form of unity which they call "physical unity", and some more important, but unnamed, type of unity which is required for the constitution of an "individual" or a "person". No evidence is adduced for denying that the zygote has some such stronger form of unity, still less for asserting that it has two centres of organization - which would be required for even the start of a comparison with the two centres of organization in the brain cortexes and the brain stems of two-headed Siamese twins.

An even stranger distinction is alleged, between a cell and its contents, with the claim that the contents cannot have the same degree of unity as the cell itself. Again no evidence is cited, and the evidence of the embryological textbooks and articles, whose accounts of what happens after penetration of the ovum indicate a great deal of coordination between a number of processes, and a definite unity of order rather than any duality of focus, are ignored.

Even more baseless is their criticism of our description of the processes that go on in the cell:

The authors at times use terms which suggest that the cell is an outer membrane around a rather soup-like interior. They describe the entry of the sperm into the ovum in terms which are most appropriate to processes such as dissolving a solid in a liquid. (25)

Nor is the cytoplasm of the ovum a fluid in which things are dissipated or dissolved. It is, rather, as the other kind of language employed by the authors suggests, complexly structured. (25)

If the cytoplasm were a "soup", that is, a more-or-less homogeneous fluid in which added objects dissolved, it would be plausible to think of the entry of the sperm into the ovum as unification, or mixing, or of its ceasing to be identifiable. Since the cytoplasm is not so soupy, it is quite inappropriate to describe the processes in this way, and also fallacious to draw any conclusions which depend on such descriptions. (25)

All this is a misrepresentation. We simply do not use any such terms as "soupy", or "dissipated". We do not paint a picture of "previously discrete objects...becoming

hopelessly dispersed throughout a fluid" (25). The terms cited from our text "of contents being **released**, of **mixing**, of an object **ceasing to be identifiable**" - do not suggest such terms or notions. Indeed both the IVF teams which we quote (S8) use the word "release"!

We do use the term "dissolve" - once - applied to the membranes of both pronuclei just before syngamy (S12), and we claim that in this context it is appropriate.

We do say that "the sperm cell ceases to be identifiable" (S9) after its membrane has opened to and joined the cell-membrane of the ovum, and we insist that this is correct. Nothing can properly be identified **as a cell** if it lacks a membrane of its own. That is the state of the nuclear material which has come from the sperm. This material is formed into a pronucleus only when a new membrane, formed from material provided by the cytoplasm of the ovum, has been built around it. At this stage it can no longer be called "the sperm cell".

It is not just the language but the description of events by the authors which is scientifically wrong and misleading. They say

> *the head of the sperm remains a discrete object within the ovum, forming the male pro-nucleus. This pro-nucleus is a discernible .... entity (25).*

The head of the sperm is not within the ovum. The male pro-nucleus is not the head of the sperm. We have taken pains at a number of points in our paper (SS9, 10, 20, 22, 25) to give a more accurate statement of both these matters.

The authors have earlier misrepresented our argument and the facts in a similar way when they speak of the sperm penetrating the ovum (21;24). A cell which has lost its limiting membrane is no longer a distinct individual. The sperm is not a distinct individual within the ovum, because it gave up its membrane which fused with the ovum membrane before the contents of the sperm head entered the cytoplasm of the ovum.

The objections, then to our claim that the new individual has commenced to exist before syngamy, are not satisfactory, and our positive arguments that this individual exists from ovum penetration remain intact.

THEIR BASIC ARGUMENT

So much for the five criticisms which the authors express as a summary of their article. I have tried to follow them in the ins and outs of the article itself. But the matter can be simplified by concentrating directly on the biological evidence adduced and the basic questions raised instead of on the more superficial logical categories which the authors favour.

Capacities of sperm and egg

They say, on the one hand, that the capacities possessed by the penetrated ovum are not relevant to the question of when a new individual human life begins, on the grounds that these capacities were already possessed by the sperm and ovum long before they were united, and on the other hand, that these capacities are only some of those possessed by the adult human being.

Questions arise as to (a) what sort of happening might mark the beginning (or indeed the end) of a particular individual, and (b) whether there might be any discontinuities (such as the difference between two and three) involved in the development of living things and (c) how they might be observed. Also, (d) how information on the capacities possessed at any stage might be relevant to these issues.

Pronuclei as siamese twins

Secondly, they say that a penetrated ovum is not an individual because the pronuclei within it might be distinct individuals in much the same way as the two persons who are Siamese twins with bodies joined below the neck.

The questions arise as to how they know that these Siamese twins are indeed two persons and whether the criterion involved in such discernment is genuinely applicable to the pronuclei.

Union of genetic constituents

Thirdly, they say that the penetrated ovum is not yet a single individual because its genetic constituents are not yet united.

The questions arise as to what degree of union is required between the parts within an individual, and what sort of union genetic constituents normally have.

Let us reply to these three also in reverse order.

REPLIES

Union of genetic constituents

The normal adult is an individual with a single identity even though he or she has parts which can be identified, such as fingers and bloodcells, because each of these parts belongs to an organized unity, that is, each part has an intelligible role, a past origin and a future orientation that make sense as contributing to the development and relative permanence of that individual person.

The genetic constituents are never completely united to each other even in an adult. The only time they seem to come close to this is when the germ cells for the next generation are being prepared, in the first stage of the process called meiosis. Otherwise, each chromosome, whether it has come from the mother or from the father spends most of the time in its unravelled state, as a single thin string of enormous length. At other times this string becomes highly compacted, by regular coiling, looping, and the like, into a double rod about fifty-thousand times shorter,[3] at which stage it can be seen in a microscope and can be matched in length and banding with a corresponding (but not identical) chromosome that has come from the other parent.

Photographs of a cell at syngamy, showing chromosomes lined up as parallel pairs in metaphase, could however be misleading, as the members of each pair shown have **not** come from the sperm and ovum respectively, but are simply the distinct threads (chromatids) of a single chromosome which came from just **one** of these.

Each chromosome contributes to the whole body either by providing plans for the formation of a large variety of proteins or by being duplicated to be able to continue such functions in daughter cells. The matching chromosomes are hardly "unified" by anything more than being contained within the same nuclear membrane, or coming under the same set of microtubules. Such unification has already been achieved by being within the cell membrane and being moved by other microtubules towards the second pronucleus.

By far the most important "union" of paternal and maternal genetic material occurs when one assorted packet of chromosomes carried by a particular sperm (from among the eight million basic such assortments available from the same father[4] penetrates the ovum and initiates reactions that exclude the entry of competing packets.

Syngamy is no permanent union of a higher sort. It is

a stage at which all the individual compacted chromosomes are held in a definite pattern by a spindle of microtubules. This stage will recur some 40 times in each of the daughter cells as they duplicate to build the whole body.[5] But at other times each chromosome will be in its unravelled ("decondensed") form, and it always remains of definitely maternal or paternal origin. At all times after penetration of the ovum the activity of each chromosome is appropriate to the building up of the adult. There is no discernible activity incompatible with this (directed to some specifically paternal or maternal project) such as might indicate two distinct organized entities.

The authors' claim that the *the pre-syngamy cell is not unified (because) its genetic constituents are not unified (22)* seems based on some vague notion of unification and some imaginary view of what happens to the chromosomes.

Pronuclei as Siamese twins

Each of the Siamese twins in question has a full brain. The brain stem organizes bodily functions such as respiration. The brain cortex is a highly organized set of cells that allows the notably unified and unifying activities of understanding, affirming and deciding, to occur. Hence these Siamese twins have two distinct centres of organization.

No such organizing power is associated with a pronucleus. Its haploid set of chromosomes seems to be quite lacking in the organizing power possessed by a diploid set. And the evidence is that the means by which chromosomes influence the cell, namely transcription of their genetic code into messenger RNA, is not active at this stage. On the other hand, chromosomes in the pronucleus are subject to the organizing powers of the whole cell, and are being moved around by some of its organelles.

There is no serious parallel until it can be shown that the main process occurring in the Siamese twins is an organized move towards the joining of their brains into one!

Capacities of sperm and ovum

It is clear (a) that a new individual living thing begins to exist when one thing with its own single unity of organization divides to become two distinct things, each with an independent focus of organization, or when two distinct things, each of which has its own independent organization, merge so that all comes under a single organization of a different type. (But if one organization persists without turning into one of notably greater complexity then it is not a new individual, but more like one thing that has eaten another.)

Those two cases can be distinguished fairly easily by examining and comparing the powers possessed by each of the individuals that existed before and after the union. We thus have an answer to (d). Information about the capacities is relevant to questions about new individuals, while being essential to questions about kinds of individual (for instance "a new **human** individual"). And there is no logically vicious "shift" involved in examining an issue aspect by aspect.

The end (or death) of an individual occurs when its single overall organization ceases to exist. It may divide into two or more independently organized things of different sorts from the original (e.g. organs, cells, molecules), or it may be taken over (e.g. eaten) by some other thing, whether of a higher type (as when I eat a bean shoot), or of a lower or a similar type (as when I am eaten by a lion or a cannibal).

(b) Each of the events just mentioned, whether as occurring at the beginning or the end of an individual life, is a notable and (c) observable discontinuity. They are examples of what were called "marker events" by the Senate Select Committee on Embryo Experimentation. The senators were particularly interested in these and assiduously sought evidence from their scientific witnesses that might indicate the existence of a marker event between fertilization and death, but were not provided with any such evidence.

While marker events indicate when "a new individual life" begins or ends, the capacities possessed by the individual in question indicate whether that individual is human or not. Before fertilization the individuals that exist are one ovum and many sperms. None of these has the capacity to do the sort of things that humans do, so there is no human individual there at that time. To speak of ovum and just one of the hundreds of thousands of sperms that are present before fertilization as though they were a single individual is fanciful. It also diverts attention from what is such an outstanding example of a marker event - the capture of one of those sperms by the ovum.

As for the person who claims that not all of the specifically human capacities are possessed by the fertilized ovum, it is up to him to show both where the other capacities come from and why the fertilized ovum, with its full set of genetic powers, is incapable of producing them. No one, so far, has managed to do so.

The rudimentary scientific evidence produced by the authors fails to undermine the case we put in our article. When they face up to the questions that arise even out of that evidence, they will find that the hypothesis, that a new human individual begins to exist when the contents of the head of a sperm have penetrated an ovum, is the only one that makes sense.

FOOTNOTES

1. Stephen Buckle and Karen Dawson, "Individuals and Syngamy", **Bioethics News,** vol 7 No.3 (1988), 15 - 30. Page numbers given in my text will refer to this article.
2. Identifying the Origin of a Human Life: The Search for a Marker Event for the Origin of a Human Life," **St Vincent's Bioethics Centre Newsletter,** Vol. 5, no. 1, March 1987, 4-6. References in my text preceded by "S" refer to the paragraphs in this article, which we request our readers to count.
3. John R.S. Fincham, **Genetics,** Bristol: Wright, 1983, 23.
4. Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts, James D. Watson, **Molecular Biology of the Cell,** York: Garland, 1983, 779.
5. C.R. Austin, "The Egg", in C.R. Austin and R.V. Short, **Reproduction in Mammals,** Book 1, **Germ cells and fertilization,** Cambridge: C.U.P., second edition, 1982, 53.