The Negative Rate Chrono-Synclastic Infundibula

On March 25, 2014, Reuters reported the latest rumblings from ECB Governing Council members contemplating imposing a negative interest rate on commercial bank deposits held at the central bank.

Bundesbank President Jens Weidmann was reported by Reuters as saying that a negative deposit rate could be a way to deal with a strengthening Euro: "If you wanted to counter the consequences of a strong appreciation of the euro for the inflation outlook, negative rates would, however, appear to be a more appropriate measure than others…The impact such a step would have to improve bank lending to companies and households was, however, 'debatable', he said".

At the same time, Bank of Finland Governor Erkki Liikanen was reported to have said that "…a negative deposit rate was 'no longer a controversial issue'".

I have consistently said that negative deposits rates are a bad idea and that they will not have the impact that many seem to believe they would have—spur lending. In fact I have argued that they would have a negative impact on financial intermediation and thus hinder credit expansion.

This leads to three possible conclusions, I am right and those supporting negative rates are wrong; I am wrong and those supporting negative rates are right; or there is a "*chrono-synclastic infundibula*"[1] where we are both right. Here I will explain why—under the current circumstances governing the ECB operational framework—imposing a negative ECB deposit rate would be nonsense. I will then explain how the operational framework could be changed so that it might make sense for certain limited purposes, e.g. reducing Target 2 imbalances or weakening the Euro. In passing, I will discuss why the successful Danish experiment with negative rates is not directly applicable to the ECB.

The Eurozone countries collectively are experiencing negative rates of credit expansion and a weak recovery from the Great Recession. Naturally there have been calls for further monetary policy stimulus including unconventional measures to spur lending directly or reduce interest rates. The ECB wishes to spur real economy lending and also keep inflation at its target.

One of the measures that has been discussed off and on for more than a year has been to impose a negative interest rate on bank deposits held at the ECB. This essentially would be charging the banks a fee to hold their balances at the central bank.

The arguments in favor of this measure fall along three lines.

- Reducing policy rates is expansionary so reducing this rate will be expansionary
- Taxing "idle" deposits will lead commercial banks to lend them "out" to the real economy
- This policy "worked" in Denmark (Denmark, using the Dkr, is not a Eurozone country)

In order to examine these arguments it is necessary to set out the salient features of the Eurozone payments system (Target 2) and the ECB monetary operations framework. Then I will explain the Danish system and monetary operations framework and point out why negative rates "work" there but would not work in the current ECB system.

[1] From Vonnegut (1959), *Sirens of Titan*. See excerpt at the end of this paper for a definition of c-s i.

Eurozone Payments System and Monetary Operations Framework

Commercial banks operating in the Eurozone do not hold deposits directly at the ECB. They hold deposits at their respective national central bank. In published statistics, the ECB aggregates the balances held at all the Eurozone member central banks. Commercial banks hold two types of account at their national central bank. One is called the "current" account and the other the "deposit" account.

The *current account* is the workhorse account since payments among banks are effected through them. During an average day almost 500,000 transactions are processed through Target 2 with an aggregate average daily value of € 2.5 trillion[2]. Average aggregate end-of-day current account balances prior to the crisis were approximately € 209 billion (May 2008) meaning that the average balance turned over 12 times a day. *Deposit accounts* played a very small role pre-crisis. The average balance in aggregated Eurozone deposit accounts was € 310 *million* during May 2008.

Current account balances are also used to satisfy the ECB's reserve requirement. Eurozone commercial banks are required to hold, on average during a given month, current account balances equivalent to a specified ratio (currently one percent) of specified liabilities measured two months prior. In other words, the average amount in a bank's current account during April 2014 would need to be no less than one percent multiplied by average liabilities subject to the reserve requirement as measured during February 2014. Banks are paid interest on the portion of the current account used to satisfy the reserve requirement (the rate is the average interest rate on the ECB's main refinancing operations—currently 25 bps). Current account balances in excess of the required reserve are not remunerated.

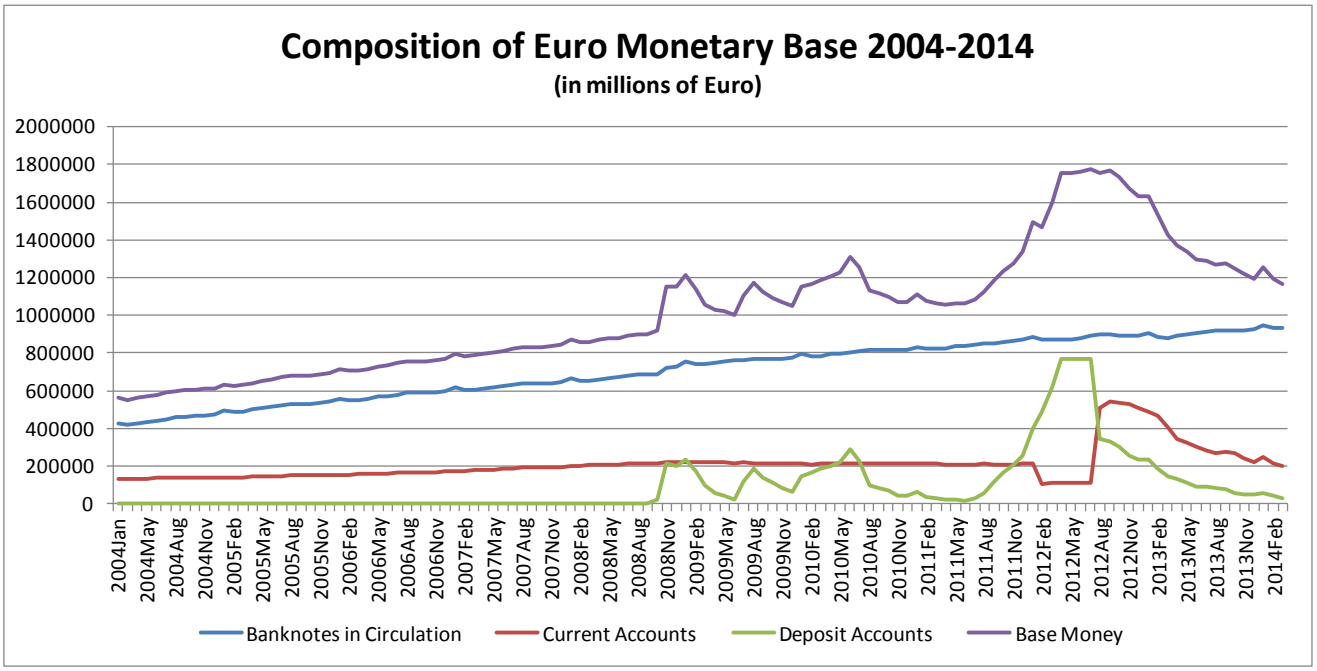
In order to understand the role of the deposit account, it is important to understand the role of the commercial bank reserve manager or treasurer. During a given month, say April 2014, she knows that the average balance in the current account must be at least X. The average monthly balance is calculated as the average amount remaining in the account at the end of each day in the month. Toward the end of each working day she will see the likely end-of-Target 2-trading-day current account balance for her bank. She may decide—based on experience; knowledge of her bank's flows going forward; observed interbank trading rates; and statistical algorithms; to either ride that balance and allow the bank to close there for the day; trade balances (either buy or sell overnight deposits) with another bank at a negotiated rate above the deposit rate—before Target 2 closes, or request access to the ECB deposit facility within 30 minutes of the close of Target 2 (6 pm European Central Time). In normal times, recourse to the deposit account is seen as a failure; essentially the bank held too high a balance during the month and could not find an interbank trade at rates in excess of the deposit rate—the "floor" on the ECB interest rate corridor. That is why current account balances typically dwarfed deposit balances—in May 2008, current account balances were 674 times larger than deposit account balances.

As noted above, use of the deposit facility was rare before the crisis. During the crisis, however, two factors arose that altered the calculation of reserve managers. The first was that banks became reluctant to lend to one another. Whereas before the crisis, it was broadly accepted that an overnight loan to another bank was risk-free, during the crisis banks became very wary. The interbank market functioned less well and banks desired to hold higher liquid reserves than they had been comfortable with prior to the crisis. Therefore, when they obtained excess reserves they were more likely to hold

[2] Source: ECB website. Data is daily average during 2012. Comparable figures for US Fedwire are 524,000 daily transactions with a value of US$ 2.4 trillion.

them in the current account during the day and then transfer them to the deposit account overnight rather than lend them to another bank. The second factor was that as the ECB provided additional reserves to the financial system to meet the increased demand, "everyone" became long reserves. In other words not only did the market as an aggregate have excess reserves (current account balances in excess of what was required to meet the required reserve) but virtually "everyone", i.e every bank, had excess reserves. In that circumstance, there is little secondary market demand to borrow current account balances and, of course, no supply at rates equal to or below the deposit account rate.

The key take away is that commercial bank transfers from their current account to their deposit account are completely *at their own discretion.* Consequently, the imposition of a negative rate on the deposit account under the current framework would be a complete farce. Banks would simply keep all of their funds in their current account. This behavior has already become evident since the ECB reduced the deposit rate to zero in July 2012 (see chart below).



From January 2004 through December 2011, banknotes in circulation and current account balances grew steadily owing to nominal growth in the Eurozone economy and the addition of new member countries to the Eurozone. Deposit account balances were virtually zero going into the crisis but explain almost the entire volatility in the monetary base between October 2008 and January 2012.

After having grown to a value exceeding current account balances in June 2010, deposit balances fell to almost zero (18 billion) by June 2011. At that point, the monetary base (purple line) had returned to its pre-crisis trend line. Deposit balances began to grow again in late 2011, accelerated by the introduction of the ECB Long Term Refinancing Operations (36 months duration with the option to repay as early as 12 months) announced on 8 December 2011. € 489 billion was allotted on 22 December 2011 and € 530 billion on 1 March 2012. Augmenting the surge in deposit account balances was the reduction in the ECB reserve requirement from two to one percent effective 18 January 2012. Banks transferred newly excess balances from their current account into the deposit account to obtain the 25 bps available on the latter. This explains the drop in the red line by 50 percent evident in the figure.

The most interesting impact followed the reduction of the deposit rate to zero effective July 11 2012. From that point onward, there was no incentive to transfer excess current account deposits into the deposit account—both yielded zero. As is evident, banks immediately began to allow funds to remain in their current account overnight, this explains the sharp fall in deposit account balances and rise in current account balances at that time. Subsequently, the repayment of ECB loans is evident in the decline in both account balances which has accelerated since the first LTROs began to be eligible for repayment. Since banks are confident that they can obtain "full allotments" at the ECB's weekly main refinancing operations, they are seeing little need to pay interest on the LTROs only to hold balances in their accounts obtaining zero interest. Deposit account balances fell by 50 percent between January and March 2014 and now stand at € 30 billion. Current account balances are now € 201 billion, slightly lower than they were in December 2012 before the halving of the reserve requirement. Consequently, banks in the aggregate would appear now to have approximately € 130 billion in excess reserves.

Meanwhile, since the reduction of the ECB deposit rate to zero in July 2012, loans to the private sector in the Eurozone have fallen by € 645 billion or 5.8 percent in nominal terms (as of end-February 2014). During the same period, banks' deposit account balances at the ECB have fallen by € 729 billion or 95 percent. I am pointing this out to make it clear how wrong is the idea that lowering the "incentive" for banks to keep deposits at the ECB will lead them to lend them "out" to the private sector. As I have explained elsewhere, banks do no lend reserves to the nonbank private sector. Taxing their reserve holdings at the central bank would lead banks to reduce them, yes, but the available means comprise: repaying credit from the central bank (European banks have done this massively already), make advance payments of taxes to the government—thereby moving the balances to the government accounts at the Eurozone member central banks, exchanging ECB deposits for banknotes and placing them in their vaults, imposing negative rates on customer deposits to encourage withdrawals in cash, and purchasing foreign exchange from the central bank. Since the ECB is not intervening, this last option is not possible. Any other attempt by an individual bank to reduce its excess reserves will be impeded by the fact that another bank will be at the other end of the transaction with the identical desire.

Denmark's arrangement

The key feature to understand about Denmark's monetary operations framework is that the central bank operates a fixed exchange rate regime. The Danmarks Nationalbank (DNB) is willing to buy or sell Dkr for Euro within a narrow range. In other words, although Denmark negotiated an op-out from adopting the Euro, its monetary policy essentially is tied to that of the Euro by choice. This means that when Euro interest rates rise, the Dkr tends to weaken and the DNB finds banks wanting to sell Dkr for Euro. In response, to keep the exchange rate stable, the DNB will both sell foreign exchange and allow an increase in interest rates—consistent with the decrease in Dkr monetary base.

The important implication of a fixed rate regime for our purposes here is that the commercial banks are able to directly influence the size of their local currency deposits at the central bank by trading them for foreign exchange. If a commercial bank wishes to reduce its deposits at the central bank it can simply sell them to the central bank for foreign exchange deposits abroad. This is not possible within a floating exchange rate regime. In that case a commercial bank may sell its current account deposits for foreign exchange but the counterparty who sells the foreign exchange will receive a deposit at the central bank

in payment. Hence, in a floating exchange regime the quantity of deposits at the central bank does not change, they merely are shifted among financial institutions with accounts at the central bank[3].

Denmark's operational framework also differs from the ECB in another important way. Although Danish banks employ a similar liquidity management framework—with a current account and a deposit account—the DNB imposes a ceiling on excess reserves that the banks may hold in their current accounts. If the system as a whole is above the limit, those individual banks above the limit have their surplus current account balances *automatically and involuntarily* transferred to their deposit account. As noted above, in the ECB there are no such limits and consequently all transfers of funds from a Eurozone commercial bank's current account to the deposit account are voluntary.

This distinction explains why the DNB is able to effectively impose a negative interest rate. But it is important to understand that the motive for the DNB's policy has not been to increase lending in Denmark, in fact it is the exact opposite. The Danish central bank imposed negative rates to alleviate pressure on the currency to appreciate and to stem capital inflows. The taxation of Dkr base money above the level the DNB sees as consistent with its monetary policy objectives incentivizes the banks to reverse the capital inflow and reduce local currency liquidity. In other words, in a fixed rate regime, banks can convert reserves into forex at will so negative deposit rates can be effectively employed to manage exchange rate pressures.

Finding the *Chrono-Synclastic Infundibula*

The obvious first prerequisite to make negative ECB deposit rates effective is to require transfers to the deposit account by placing a ceiling on current account balances. In the absence of this measure imposing negative rates on the deposit account will be like stepping on the gas pedal of a car in neutral.

As explained above, a mere technical modification of the ECB account system would lead neither to greater interbank lending nor, certainly, to expanded credit to the real economy, although it might pressure the exchange rate. In order to make the thought experiment easier to imagine, suppose the ECB introduced the negative rate penalty on all bank balances above the required reserves and that the negative rate was 100 bps per month rather than the mooted 25 bps per annum.

From a macro perspective, the current Eurozone reserve requirement amounts to around € 100 billion while excess reserves are about € 130 billion. Let us make the math easy and assume each bank has 1 Euro in excess reserves for each Euro in required reserves with a total potential "tax" base then of € 100 billion in excess reserves. Imposing a 1 percent per month negative rate on deposits would cost the banking system € 12.7 billion per year assuming no change in excess reserves.

In the current low interest rate environment, a 12.7 percent annual negative rate is quite punitive. How would banks react? Certainly they would try to lend out their excess reserves to other banks. But the other banks would not wish to hold additional reserves—accumulate more "hot potatoes" subject to the negative deposit rate tax. In other words, a bank would have to *pay* another bank a significant rate, more than 12.7 percent, to take a loan. So that is not a promising approach.

[3] Obviously, the bank selling local currency for foreign currency does not need to make the purchase directly from another bank. It might purchase forex from a dealer who is, for example, representing an industrial exporter. However, the transaction executed through Target 2 will be in "central bank money" and an agent of the dealer or ultimate seller will receive the payment in the form of a deposit at the central bank.

More promising approaches would be for the banks to:

- Request large amounts of high denomination Euro banknotes from the ECB and fill up their vaults. This would reduce excess balances in the deposit account.
- Advance any tax payments due, thereby moving balances from their deposit account to the government's account at the National Central Bank.
- Impose negative rates on customers' deposits and/or provide incentives for customers to make cash withdrawals.
- Accelerate the repayment of any amounts due to the ECB and increase reliance on access to full allotment tenders available at the ECB monthly main refinancing operations.

In other words, the objective of every bank would be to minimize its excess funds at the central bank. Why anyone would think this would lead banks to increase lending to the real economy is truly baffling unless they are locked into the false worldview that banks lend "reserves" to customers. Banks simply do not lend deposits at the central bank to retail customers. They lend them to each other (wholesale) but never to real economy entities not entitled to hold them. Neither ExxonMobil, Apple, Peter Stella, nor my dog may hold an account at the ECB, Fed, or Bank of England. No matter how much a bank would like to pass us their hot potato, it simply is not possible.

There is one extremely negative consequence of imposing highly negative rates that may not be evident: the risk of a breakdown in the payments system. As discussed above, Target 2 handles a daily average of € 2.5 trillion in payments effective in central bank money (current account balances). Generally speaking, banks prefer to *accumulate* balances over the course of the day through Target 2. This means their balance sheet is growing--their customers are receiving payments, deposits are growing and their assets are also growing. In any given day, a bank treasurer obtaining a surplus during the day through Target 2 has additional funds to loan out to other banks who they know are short of funds (given a fixed supply of reserves, if I am long the rest of the market must be short). But in an environment where deposits at the central bank are taxed, and taxed heavily, treasurers would very much wish to avoid accumulating balances net. These "hot potatoes" would indeed be avoided at all costs. Consequently, they would likely, at some point, begin to refuse to accept payments from other banks. This would immediately cascade to their customers as they would find themselves unable to make payments to counterparties with accounts at other banks unless they were willing to pay prohibitive fees. While banks would be willing to settle payments among customers with accounts at the *same* bank, they would be unwilling to accumulate additional balances at the central bank resulting from inflows originating from customers of other banks. Eventually they might be willing to set up an alternative payments system that settled in physical Euro banknotes or in foreign exchange or even in something such as bitcoin. This would make the payments system exceedingly complicated, cumbersome, and expensive. It would also drive a wedge between cash Euro (banknotes) and noncash Euro (deposits).

Although the dissolution of the payments system might seem plausible only in a science fiction novel, I witnessed similar cases while working for the IMF. Banks unable to exchange their central bank deposits for banknotes or foreign exchange—essentially their central bank accounts were frozen—set up an alternative settlement mechanism. Settlement was required either in physical US currency or in deposits in USD in New York. The central bank was actually expelled from the local banking clearinghouse for failing to meet these settlement criteria. A very large gap between the face value of cash banknotes and non-cash deposits arose even though both were notionally denominated in the same unit of account. Depositors began to have two accounts, one that had been funded with cash or foreign exchange "cash

dollars" and one funded with noncash account balances "noncash dollars". "Cash dollars" might trade at a 40 percent premium to "noncash dollars".

Essentially in a highly negative deposit rate scenario, banks will attempt to shrink themselves to the point where excess reserves are zero—hardly a promising environment for credit expansion.

Now there are very smart people in key positions at the ECB so what alternative reality might they be imagining? One consequence of negative rates would be to make holding Euros less attractive. Throwing sand into the Eurozone monetary transmission mechanism, imposing negative rates on customer deposits, and taxing banks would presumably weaken the Euro. Regardless of whether this is a sensible way to weaken the Euro—as opposed to simple ECB foreign exchange intervention—is beside the point. If the aim is to weaken the Euro and spur demand that way, with the added "bonus" of stirring inflation, this policy might "work". Indeed, it seems that whenever Mario Draghi mentions negative rates the Euro takes a bit of a hit. Actually putting the policy in place might have an even greater impact. So this angle seems to make sense of Bundesbank President Weidmann's remarks cited above—it would have an impact on the exchange rate but the impact on credit expansion would be negative.

Coupling negative rates with ECB intervention might provide extra bang for the buck. This essentially would be deviating from the floating exchange rate policy—but if the policy is to weaken the Euro then intervention becomes the first best tool to implement it. Intervention would also allow the banks to rid themselves of excess reserves in a smooth way without the negative, presumably unintended consequences, of the negative rate policy. The ECB would then be adopting not only the Danish technical conditions but also the policy of exchange rate targeting[4].

But suppose tabling the prospect of forex intervention is too controversial for the ECB. Is there another constellation of arrangements where negative rates might make sense?

Suppose, rather than an even distribution of excess reserves that we have assumed heretofore there are two classes of Eurozone banks. One class, we will call "northern" banks, hold all the excess reserves and the other class, the "southern" banks hold zero excess reserves. Let us assume that 70 percent of the banks are northern and 30 percent southern. So the northern banks hold € 70 billion in required reserves and € 140 billion in excess reserves (2 € in excess reserves for every € of required reserves) and the southern banks hold € 30 billion in required reserves and € 0 billion in excess reserves.

Now suppose the ECB reset the system as follows. Banks may hold up to 120 percent of the required reserve in their current account. The required reserve portion will continue to be remunerated as currently; any balance in the current account above 100 percent up to 120 percent will not be remunerated or taxed. All current account balances exceeding 120 percent of the required reserve will be automatically placed into the deposit account at the end of the Target 2 day. The deposit account will be assessed a negative rate. Let us say the rate is -50 bps.

What might be the impact of this new arrangement? Northern banks, assuming no change in excess reserves, would pay annually € 630 million (€ 140 billion – € 14 billion) X .005. Southern banks would pay nothing. They would be € 6 billion under the limit of their current account. Clearly, an arbitrage opportunity arises in this case. Interbank loans from North to South would allow the consolidated

[4] The Swiss National Bank set a minimum rate of CHF 1.2 per Euro in September 2011. Since then the SNB has been willing to sell an unlimited amount of Sfr for Euros at that rate.

system to partially avoid the negative rate tax. That is, loans of € 6 billion from the North to South would allow the North to reduce their deposit balance by € 6 billion, saving 50 bps on the loaned amount while not imposing a taxable surplus on the part of Southern banks—i.e. the ECB would be making the potato "hot" only in the North[5]. So the Northern banks would have an incentive to *pay* the Southern banks to take from them interbank loans.

Would this make much difference to the Eurozone real economy? I personally do not think so. But at least it makes some sense and would act to more tightly unify the Eurozone monetary system.

So there seem to be two chrono-synclastic infundibula within the Eurozone monetary universe where negative rates might make some sense. One would be forced access to the deposit facility coupled with foreign exchange intervention to weaken the Euro. This we might call the Danish "location".

The second chrono-synclastic infundibula would be where the idea is to tax banks very long reserves to persuade them to lend to banks less long reserves. The objective here would be to move excess reserves from the "North" to the "South".

Of the two options, forex intervention would in my view be more powerful. The problem, of course, is that the ideal rate currently for the "North" and "South" is not the same.

The nonintervention alternative would alter the interbank lending calculus a bit—taxing the North and subsidizing the South, would reduce Target 2 imbalances, and perhaps improve the perceived liquidity position of banks in the South. It might also weaken the Euro somewhat but applying more than a small negative rate would likely lead banks to find a way to reduce excess reserves to zero.

On the other hand, taxing excess balances held at some surplus banks but not others would effectively set up a dual noncash Euro and direct flows just as is the policy objective with Denmark's negative rate policy. Rather than through the foreign exchange market, these Eurozone flows would be internal to maintain the "North/South" noncash Euro rate at one-to-one. In a small dose, this remedy might provide some benefit, but I have seen heavy doses lead to chaos and ruin. For that reason I suspect Dr. Draghi, if he does apply this medicine, will do so in a dose he is well aware will have little or no real impact. His objective will be to achieve the placebo effect, so masterfully obtained with his announcement of the yet-to-be-used "Outright Monetary Transactions" in August 2012.

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Kurt Vonnegut, *Sirens of Titan* (1959), (pages 8-9).

"Just imagine that your Daddy is the smartest man who ever lived on Earth, and he knows everything there is to find out, and he is exactly right about everything, and he can prove he is right about everything. Now imagine another little child on some nice world a million light years away, and that little child's Daddy is the smartest man who ever lived on that nice world so far away. And he is just as smart and just as right as your Daddy is. Both Daddies are smart, and both Daddies are right….Only if they ever

[5] Of course, the ECB policy would have to be superficially neutral and apply equally to banks across the Eurozone regardless of domicile. Nevertheless, it is well understood which banks are currently "long" liquidity.

met each other they would get into a terrible argument, because they wouldn't agree on anything. Now, you can say that your Daddy is right and the other little child's Daddy is wrong, but the Universe is an awfully big place. There is room enough for an awful lot of people to be right about things and still not agree…The reason both Daddies can be right and still get into terrible fights is because there are so many different ways of being right. There are places in the Universe, though, where each Daddy could finally catch on to what the other Daddy was talking about. These places are where all the different kinds of truths fit together as nicely as the parts in your Daddy's solar watch. We call these places chrono-synclastic infundibula.