in the sources, most notably zircon. In areas dominated by metasedimentary gneisses (e.g. the Sörmland basin), these small-scale intrusives are peraluminous, S-type, two-mica granites.

The anatectic granite and pegmatite formation in Bergslagen has been related to continental collision and crustal thickening (Romer & Smeds 1994, 1997, Öhlander & Romer 1996). In contrast, the larger intrusions have been interpreted as induced by mafic underplating in response to subduction or lithospheric delamination (Andersson 1991, Öhlander & Romer 1996). However, very little, if any, mafic-intermediate magmatism is observed associated with these granites. The general lack of high-pressure regional metamorphic mineral assemblages in Bergslagen (cf. Andersson 1997b) and overlapping ages of both granite types and TIB rocks, seem to support a model of continued subduction, reworking and transpression/transtension, rather than collisional thickening for the period 1.85–1.75 Ga (see Chapter 8).

8. THE TRANSSCANDINAVIAN IGNEOUS BELT, EVOLUTIONARY MODELS

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As outlined in the previous chapters, rocks grouped together under the TIB heading comprise a diverse temporal and spatial collection with a large variation in individual characteristics. The concept of TIB may be used without genetic connotation, including all magmatic rocks representing a transition in time and space between the processes that formed the calc-alkaline, juvenile, arc-related early Svecofennian (1.95–1.86 Ga) crust to the east and the essentially younger calc-alkaline crust to the west (c. 1.70–1.58 Ga) of this belt. In spite of overlaps in ages at both ends (Fig. 71), the TIB granitoids can in most cases be distinguished by their typical alkali-rich geochemistry and/or coarse, mostly porphyritic textures. However, in the last years several transitions into calc-alkaline units have been recognised both among older and younger generations, e.g. in the Transition Belt of the south Jämtland Revsund massif and possibly within the Ljusdal Batholith (1.86–1.84 Ga) (Chapters 5.2 and 7.1, Ahl et al. in prep), in the (c. 1.85 Ga) Tiveden area (Wikström & Karis 1998), in southern Småland and Blekinge (c. 1.77 Ga) (Kornfält & Bergström 1991, Gorbatschev 2001, Lindh et al. 2001a), and in the transition to the gneisses of the Eastern Segment of the Southwest Scandinavian Domain (c. 1.7–1.65 Ga) (Gorbatschev 1980, Berglund & Larson 1997, Gorbatschev & Bogdanova 2003). Furthermore, in the c. 1.7 Ga Dala Province, a transition into alkaline, A-type granitoids exists (Ahl et al. 1999, Chapter 3.2). The significance of these transitions need to be addressed in any crustal evolution model for the TIB.

There is a temporal and partly spatial overlap between the late tectonomagmatic processes within the Svecofennian Domain and the emplacement of the earliest TIB generations (1.86–1.80 Ga). From the previous descriptions (Wikström et al. 1997, Chapter 2.3) it is clear that several of the earliest (1.86–1.84 Ga) intrusions of TIB affinity along the Svecofennian margin were subjected to Svecokarelian plastic deformation (1.85–1.80 Ga). Moreover, the granitoids of the Ljusdal Batholith and the coeval K-feldspar megacryst-bearing (KFM) granitoids in the Transition Belt (1.86–1.84 Ga) appear to reflect a change from TTG to more alkali-calcic compositions, approaching TIB chemical affinity (Fig. 61; Ahl et al. in prep). However, most of the Ljusdal Batholith is affected by deformation and metamorphism in amphibolite-, locally up to granulite facies, which has not affected the KFM granitoids (Lundegårdh 1967, Bergman & Sjöström 1994, Sjöström & Bergman 1998).

The TIB-1 magmatism overlap in time with the late Svecofennian granitic magmatism that intruded the early Svecofennian lithologies east of the TIB in the period 1.82–1.75 Ga (Chapter 7.2, and ref. therein). The small volume of the latter intrusions compared to the TIB, and the apparent

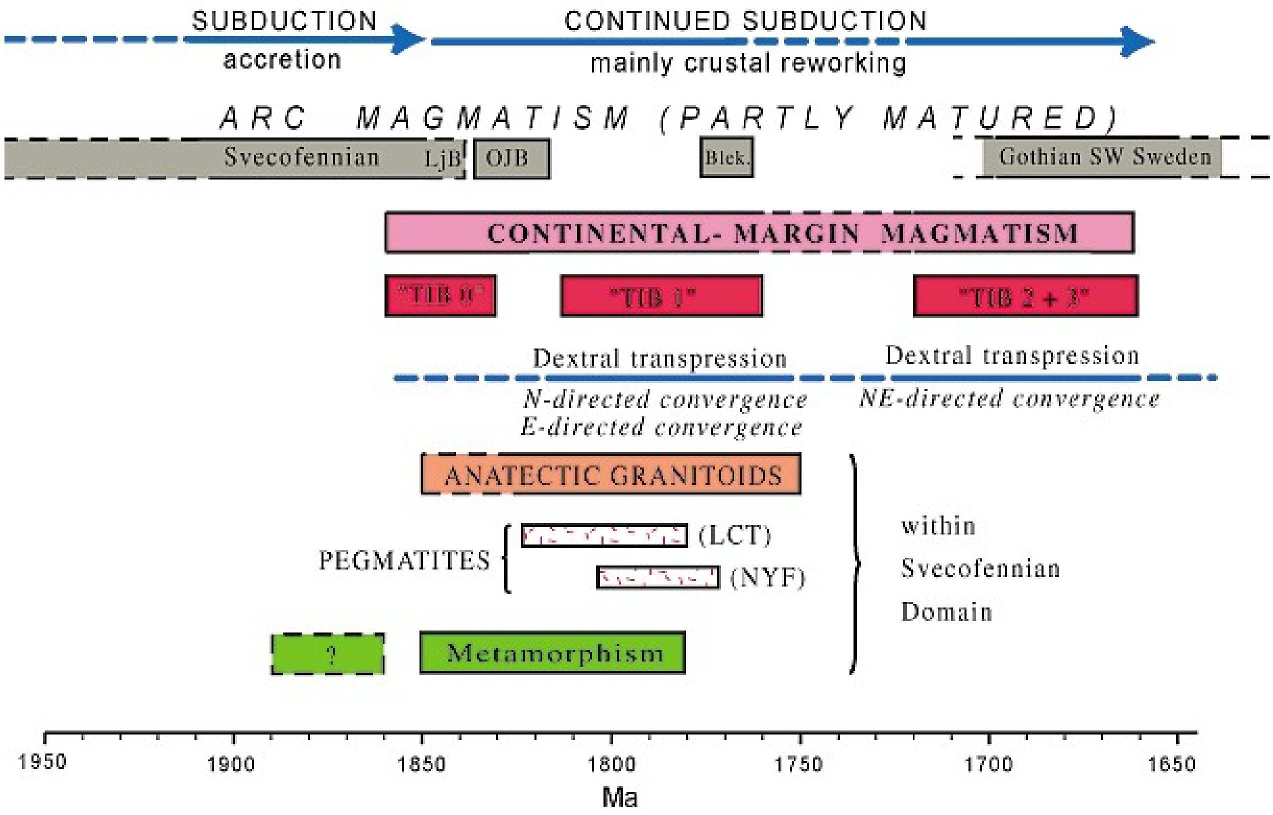

Fig. 71. Time-evolution diagram showing the duration and tectonic setting of TIB-related geological processes. See Fig. 4 for abbreviations.

control of their chemistry by the local country rocks (generally peraluminous S-type in metasedimentary- and metaluminous I-type granites in metaigneous-dominated areas; Chapter 7.2) support the interpretation of a local, anatectic magmatism in areas of lower heat flow due to less extensive mafic underplating during subduction (Andersson 1991, Öhlander & Romer 1996).

The variation in crustal thickness and composition along the TIB and neighbouring areas has profound implications for the understanding of the crustal development. Several interpretations of reflection and refraction seismic data along the FENNOLORA, BABEL and Coast profiles (e.g. Clowes et al. 1987, Guggisberg & Berthelsen 1987, Guggisberg et al. 1991, BABEL-group 1993, Abramovitz et al. 1997, 2002, Korja & Heikkinen 2000, Lund et al. 2001) yield roughly similar results for crustal sections from Blekinge in the south to the Skellefte district in the north. The thinnest crust (c. 35 km) is present in the south, south of the Oskarshamn-Jönköping belt (OJB), with a stepwise thickening of the mafic lower crust from c. 20 km in the south to a maximum thickness of c. 30 km in the transition zone between the TIB and the Svecofennian of southern Bergslagen. In the Lake Mälaren area, there is a rapid change of total crustal thickness from c. 50 km in the south to c. 40 km in the north (northern Bergslagen). The thinning is entirely within the mafic lower crust, while the felsic upper crustal rocks here extend deeper than 20 km. Northwards, below the Ljusdal Batholith the crustal thickness increases again to more than 50 km, followed by a gentle decrease across the Bothnian Basin/Revsund granitoid areas to around 40 km in the Skellefte juvenile arc area. In the area of the Bothnian Basin, the uppermost crust consists of a c. 8 km thick layer of especially low-velocity crust, which terminates just south of the Skellefte district (Guggisberg et al. 1991).

In the west, there is a general shallowing of Moho depth that approximately coincides with the Sveconorwegian frontal deformation zone (SFDZ; Wahlgren et al. 1994) (cf. BABEL working group 1993, Korja et al. 1993). This may be correlated with an uplift of the southern part of the Eastern Segment of SW Sweden in late Sveconorwegian time (c. 0.96 Ga), as determined from P-T-t considerations (e.g. Johansson et al.

1991, 2001, Johansson 1992). The shallowing of Moho continues northwards below the Caledonides up to the Norwegian coast, with an abrupt crustal thinning in the northernmost TIB areas of the Lofoten Islands (cf. Korja et al. 1993).

Concerning the formation of the juvenile calc-alkaline Svecofennian crust, most authors agree that it was formed as a series of island arc systems, successively accreted to the Archaean craton in the NE, with a sedimentary basin (the Bothnian Basin) in between (e.g. Hietanen 1975, Nurmi & Haapala 1986, Gaál 1986, Berthelsen 1987, Gaál & Gorbatschev 1987, Lahtinen 1994, Nironen 1997, Korsman et al. 1999, Väisänen 2002, and ref. therein). The earliest arc crust appears to have formed during 2.1–1.9 Ga (e.g. Huhma 1986, Patchett & Arndt 1986, Patchett et al. 1987, Valbracht et al. 1994, Lahtinen & Huhma 1997), of which only remnants exist (Wasström 1993, 1996, Skiöld et al. 1993, Welin et al. 1993, Lahtinen & Huhma 1997, Lundqvist et al. 1998). In addition, abundant inherited zircons of 2.1–1.87 Ga are found in 1.9–1.86 Ga Svecofennian rocks (Claesson et al. 1993, Kumpulainen et al. 1996, Andersson et al. 2000, 2004, Lahtinen et al. 2002, Sultan et al. 2004). Due to the pronounced bimodality of especially the volcanic rocks, several workers invoke rifting and almost complete reworking of the earliest arc crust at 1.9–1.86 Ga (e.g. Vivallo & Claesson 1987, Baker et al. 1988, Lagerblad 1988, Vivallo & Willdén 1988, Gaál 1990, Allen et al. 1996).

Regional metamorphism occurred earlier in central and eastern Finland (at c. 1.88–1.87 Ga; Koistinen et al. 1996, Korsman et al. 1999, and ref. therein), than in southern Finland and Sweden (1.85–1.78 Ga; Romer & Öhlander 1994, 1995, Andersson 1997b, Sjöström & Bergman 1998, Väisänen 2002, Väisänen et al. 2002, 2004, and ref. therein); in the latter areas overlapping with early stages of TIB formation (TIB-0,1). Areas of lower grade metamorphism (e.g. northern Bergslagen) represent shallower crustal levels (pressures 2–4 kbar and temperatures <600ºC; Rickard 1988, Stålhös 1991, Sjöström & Bergman 1998, Ripa 1994).

Three different main scenarios have been proposed after the arc-accretion stage and onset of TIB magmatism: 1) a convergent continental margin setting of Andean type (Wilson 1982, Nyström 1982, 1999, Andersson 1991, Åhäll & Larson 2000); 2) an ensialic tensional setting (Wilson et al. 1985, Johansson 1988, Öhlander & Zuber 1988b); and 3) or post-collisional extensional collapse after overthickening of the crust (Korja et al. 1993, Korja & Heikkinen 1995). The latter two models are faced with some objections:

1) There is no intermediate to high pressure metamorphism documented so far in the Svecofennian Domain recording overthickened continental crust, which would be expected to be exhumed after post-collisional extensional collapse (cf. e.g. Ruppel & Hodges 1994, Davies & von Blanckenburg 1995, Chemenda et al. 2000, 2001, Borghi et al. 2003). Variations in the Moho depth are essentially related to an uneven thickness of the lower, high velocity (density) crust, which tends to be thick below high grade, low P-high T domains such as the Ljusdal Batholith and the Sörmland Basin of southern Bergslagen. Moreover, low to intermediate pressures (4–6 kbar) are typical for amphibolite-granulite terrains over the entire Svecofennian area up to the Archaean margin (Rickard 1988, Andersson 1997b, Koistinen et al. 1996). Korsman et al. (1999, 2000) related the low P/high T metamorphism in the Svecofennian to mafic underplating shown by the thickening of the lower high-velocity seismic crust. Accretion of mafic material to the lower crust would not promote gravitational instability and collapse to the same extent as a major thickening of silicic crust by continent-continent collision.
2) The geochemical signatures of essentially all mafic TIB rocks studied so far are of subduction-related continental-margin type (Chapter 2.5, Nyström 1999, Claeson 2001, Claeson & Andersson 2000). This could be related to an entirely inherited signature from previous subduction event/s, e.g. by postcollisional asthenospheric upwelling, resulting in thinning and melting of the enriched continental lithosphere (e.g. Väisänen 2002). However, the large volumes of magmas involved along an essentially linear belt, as well as transitions to calc-alkaline units, is reminiscent of conti-

nental-margin type belts (e.g. Cordani et al. 2000, and ref. therein).
3) The lack of related extensional or transtensional structures and scarcity of dyke generations coeval with the TIB argues against an extensional collapse setting.

In fact, the southern TIB (the Småland-Värmland belt; SVB) seems to represent a massive post-accretional reworking of the juvenile early Svecofennian crust along a newly established apparently (N)NW-(E)SE-oriented continental margin in the SW. This reworking started around 1.86–1.84 Ga (TIB-0), due to northward subduction, with possibly slightly oblique convergence (Fig. 72). Abramovitz et al. (1997) traced a north(east) dipping suture through the crust and into the upper mantle below southern Bergslagen which they interpreted as a fossil trace of c. 1.86 Ga subduction. Lund et al. (2001) also recognised this suture, but added the aspect of a continuing episodic southwards accretionary and collisional growth of the crust across the entire TIB (SVB) area down to Blekinge during 1.84–1.77 Ga. See also Korja & Heikkinen (2001), who considered the Sörmland Basin of SE Bergslagen to represent an accretionary prism of this subduction. However, new calc-alkaline crust was apparently still being produced by 1.86–1.84 Ga in the Ljusdal Batholith/KFM granitoid transitional area, presently located further north between the Bothnian Basin and the Bergslagen area. This magmatism probably included some reworking of the slightly older juvenile crust, as indicated by its transitional calc-alkaline – alkali-calcic geochemistry (cf. Fig. 5.5; Chapter 5.4).

Around 1.81–1.80 Ga a transpressional regime seems to have dominated the overall tectonic setting for the TIB and southern/central Svecofennian Domain (Figs. 71, 72). Large-scale dextral and minor conjugate sinistral plastic shear zones become predominant features both within the TIB marginal areas in Östergötland and NE Småland (Beunk & Page 2001), as well as within the adjoining Svecofennian areas of southern Bergslagen (Stephens et al. 1994). Concurrently, major shear zones bounding and within the Ljusdal Batholith and in the KFM granitoids in the Transitional area further north were active with a corresponding dextral kinematics due to c. N-S convergence (cf. Chapter 6, Bergman & Sjöström 1994, Sjöström & Bergman 1998, Högdahl et al. 2001, Högdahl & Sjöström 2001). Some of these shear zones seem to have a continuation in southern Finland (Ehlers et al. 1993, Lindroos et al. 1996, Högdahl & Sjöström 2001, Ehlers & Skiöld 2001). The displacements along the dextral shear zones are not known. However, assuming onset of shearing at c. 1.82 Ga (Högdahl & Sjöström 2001), the pre-1.82 Ga position of each crustal block south of the Bothnian Basin should be stepwise increasingly eastwards compared to their current positions (Fig. 72 inset). A north-, or even northnorthwestward (cf. Ehlers et al. 1993), convergence would account for the transpressive shear resulting in the present-day geometry.

From magnetic structures and lithologies it is also possible to discern an apparent clockwise rotation of the magmatic flow in TIB-1 magmas from essentially E-W to N-S around the SW Svecofennian Bergslagen Province (cf. Fig. 4 in Andersson 1991, Fredén 1994, Koistinen et al. 2001), indicating that dextral horizontal movements were active during TIB-1 intrusion, i.e. long before the western continuation of TIB was pervasively overprinted by the 1.2–0.95 Ga Sveconorwegian orogeny. The development of the transpressional shear zones in the older crust could, in fact, have been instrumental in the localisation of TIB magma flow and emplacement in accordance with the models of e.g. Brown & Solar (1998a,b). Most of these plausible zones are now obliterated by the TIB intrusions, with a possible exception associated with the Gåsborn pluton (Chapter 2.4.3.3; Cruden et al. 1999).

The present geometry of the lower crust most likely developed essentially during the time of TIB formation (1.85–1.65 Ga). The thick section of mafic lower crust in the northern SVB and southern Bergslagen could be related to voluminous mafic underplating (cf. Lund et al. 2001) with a related strong reworking of the pre-existing juvenile crust, that in southern Bergslagen resulted in amphibolite to granulite facies metamorphism, as well as anatexis that produced both TIB intrusions and late Svecofennian magmatism.

To the south, the 1.84–1.82 Ga OJB in central Småland represents a sliver of younger, post-

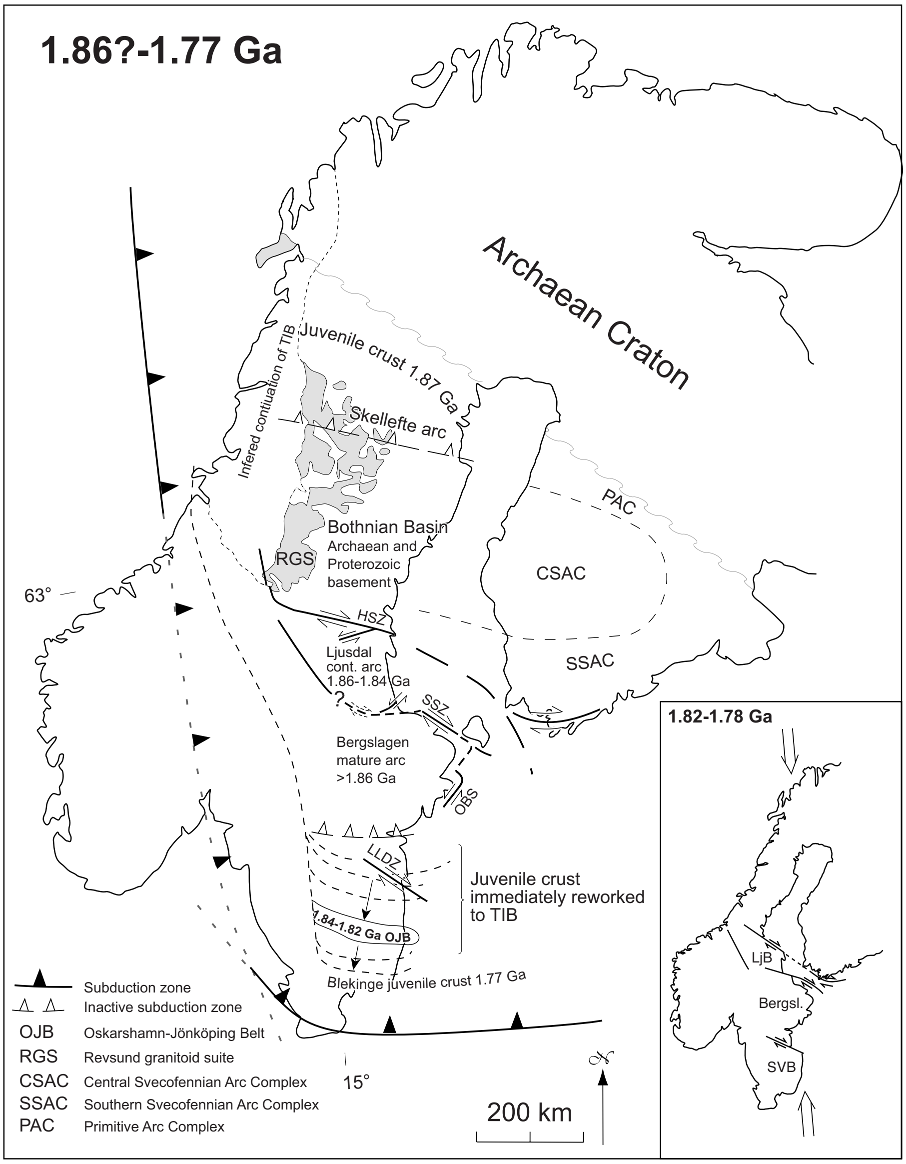

Fig. 72. Sketch showing the proposed palaeotectonic environment during early TIB time (TIB 0–1; c. 1.86–1.77 Ga), characterised by eastward subduction in the north and northward subduction in the south. The coeval shear zone kinematics in southern Sweden is in accordance with c. N–S convergence. Arrows in SE Sweden indicate retreating subduction associated with a southwards progressing continental margin growth and reworking. HSZ = Hassela Shear Zone, SSZ = Singö Shear Zone, OBS = Ornö Band Series Shear Zone and LLDZ = Linköping-Loftahammar Deformation Zone. Inset: LjB = Ljusdal Batholith, Bergsl. = Bergslagen area, SVB = Småland-Värmland Belt.

Svecofennian, juvenile crust, indicating that island-arc accretion continued oceanward from the continental margin, while reworking occurred concurrently further north. Continuous retreat of the continental margin reworking south(southwest)wards resulted in a progressive consumption of the recently accreted crust (Fig. 72).

The marked thinning of the mafic lower crust south of OJB, and particularly in Blekinge, may be partly a post-TIB feature associated with the ‘anorogenic’ Blekinge-Bornholm magmatism at c. 1.45 Ga. However, the increase in calcic character of TIB rocks southwards (Gorbatschev 2001), and particularly so in the uplifted block in Blekinge (Lindh et al. 2001a), suggests that an area of juvenile crust-production is encountered here by c. 1.77 Ga. Strong NE-dipping crustal reflectors in the Blekinge-Bornholm block (BABEL working group 1993, Abramovitz et al. 1997) may represent remnants of accreted subduction structures (cf. Korja & Heikkinen 2000), most likely later reactivated as normal faults in association with the Blekinge-Bornholm magmatism. However, Abramovitz et al. (1997) suggest that the lower crustal sections below southern TIB and the Blekinge-Bornholm Province consists of a triangular area, “the intermediate terrane”, of suppressed early Svecofennian crust, overthrust from the south by c. 1.70–1.58 Ga Gothian crust. The presence of this intermediate terrane was questioned by Lund et al. (2001).

The increased thickness of felsic upper crust and thinning of the mafic lower crust in northern Bergslagen suggest that this is a crustal block that moved down relative to the adjoining areas to the south and north. This is supported by lower T and, in particular, lower P of the metamorphism in this block (Stålhös 1991, Sjöström & Bergman 1994, Ripa 1994, U.B. Andersson unpubl. data), but questioned by the kinematics of the conjugate Singö and Ornö band series shear zones (Persson 2002, and ref. therein). However, in the north the metamorphic break follows a major E-W shear zone (cf. Kresten & Aaro 1987) (cf. Fig. 3), of still unknown kinematics.

Beneath the Ljusdal Batholith the mafic lower crust thickens considerably again, presumably as a result of a major episode of mafic underplating, syn- to post-batholith emplacement in age, causing high-grade metamorphism in many areas (Sjöström & Bergman 1998, and ref. therein). Based on existing geochemical data (including isotopes), the Ljusdal Batholith appears to consist of dominantly calc-alkaline components (cf. Chapter 7.1). This suggests that relatively juvenile arc crust was still forming by 1.84 Ga somewhere in between the (proto)continents (or microcontinents of Nironen et al. 2002) of the early Svecofennian Bergslagen area in the south and the Bothnian Basin in the north, the latter underlain partly by Archaean basement (Andersson et al. 2002). Whether it formed in situ or was transported to its present position shortly after formation from a previous position further east, as is indicated by shear zone kinematics (Sjöström & Bergman 1998), is not known.

Further north in the Bothnian Basin regional metamorphic reworking of the Svecofennian crust is bracketed between the youngest affected supracrustals and oldest unaffected late Svecofennian granites (c. 1865–1820 Ma; Kousa & Lundqvist 2000, Weihed et al. 2002). However, crustal reworking in this region continued with the formation of late Svecofennian anatectic, mostly S-type granites (1.82–1.80 Ga Härnö/Skellefte type) and the voluminous, more deeply derived, I- to A-type, TIB-1 Revsund granitoid magmatism (RGS) (1.81–1.77 Ga) (Claesson & Lundqvist 1995, Chapter 7.2), where at least the RGS is associated with significant contact metamorphism (c.f. Lundqvist et al. 1990). The RGS is essentially elongated N-S and associated TIB-1 rocks continue northwards as basement rocks of the Caledonides up to the Lofoten area of northern Norway (Romer et al. 1992, Corfu 2000, Skår 2002, Rehnström 2003, and ref. therein). This N-S trend is oblique to Svecofennian lithologies, and appear to be related to N-S oriented shear zones active c. 1.8 Ga and associated with E-W compression in the area of the Skellefte district (Bergman Weihed 2001, Weihed et al. 2002). Weihed et al. (2002) proposed an Andino-type continental-margin setting with E-directed subduction for the RGS and related rocks, including the anatectic S-type suites, in central Sweden and Norway. Moreover, this subduction scenario could then also apply to the generation of the coeval intrusive rocks inland further to the northeast transgressing across and into the Archaean craton nucleus, e.g. the roughly 1.8 Ga Lina and Edefors suites and corresponding rocks in Finland (cf. Chapter 7.2). However, little is yet known about the tectonic regimes in these areas, as well as the nature of the transition from N-S to E-W compression across the Bothnian Basin.

The coeval (1.81–1.77 Ga), partly bimodal, ‘post-collisional’ intrusive complexes stretching from SW Finland to Russian Karelia (Eklund et al. 1998, Konopelko et al. 1998, Rutanen 2001), appear to represent increasingly continent-ward magmatic expressions related to the overall tectonic regime associated with the TIB in the west, and where the mafic magmatism shows evidence of strongly increasing mantle enrichment character eastwards towards the Archaean craton margin (Eklund et al, in prep).

At c. 1.71 Ga (TIB-2), extensive igneous activity commenced in the central provinces of TIB (Dala and Rätan, Chapters 3 and 4, Lundqvist & Persson 1999). This magmatism tends to be more alkaline in character than the earlier TIB generations (e.g. Ahl et al. 1999), but is associated with calc-alkaline subduction-related mafic rocks (Nyström 1999). The graben and horst environment represented by the large volumes of well-preserved supracrustal rocks in the Dala Province, and the lack of such rocks in the Rätan Batholith, may be the result of post-TIB block movements. However, the more alkaline character of these rocks argues for an extensional setting already at the time of magmatism, possibly in an overall dextral transpressional regime which caused a NW-SE extensional environment for the Dala and Rätan Provinces (Fig. 73) as indicated by the kinematics in the coeval Storsjön-Edsbyn Deformation Zone (Bergman & Sjöström 1994, Bergman et al. subm.). The increased alkalinity and occurrence of some of c. 1.8 Ga zircons imply that the TIB-2 rocks, at least some of the c. 1.7 Ga Dala granites, may in part represent a reworking of the earlier TIB-1 crust (Ahl et al. 1999, Chapter 3.2). The very large positive aeromagnetic and gravity anomalies associated with the Dala Province, and in particular the Rätan Batholith (cf. Korhonen et al. 2002a,b), suggest that these areas are underlain by large volumes of mafic-intermediate rocks, possibly representing the heat source for the crustal magmatism by mafic underplating.

West of the Dala Province, and to the south along the western margin of the TIB-1 magmatism (1.81–1.76 Ga), 1.71–1.65 Ga alkali-rich granitoids of TIB-2 and 3 generations were

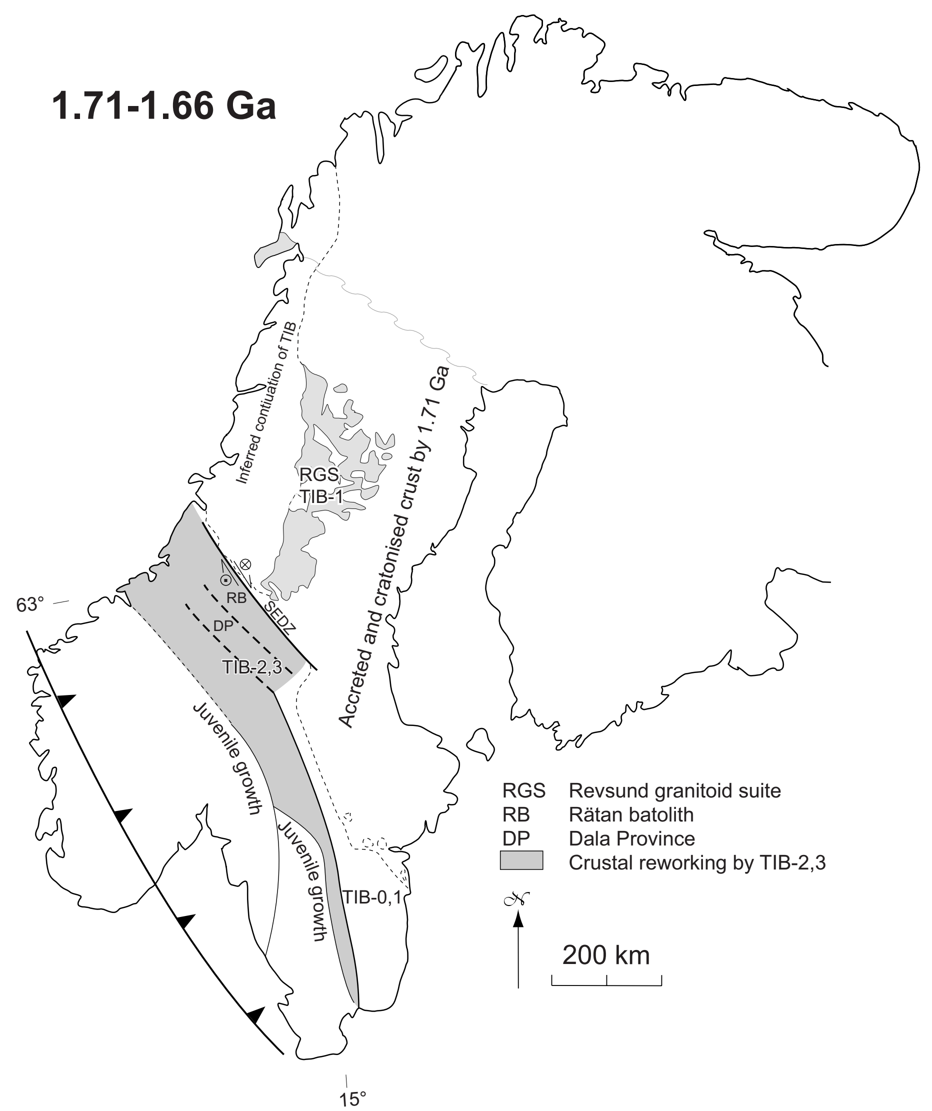

Fig. 73. Sketch showing the proposed palaeotectonic setting during late TIB time (TIB 2–3; c. 1.71–1.66 Ga), characterised by northeastward subduction, complete reworking of the earlier crust in the shaded areas, and juvenile growth further southwest. SEDZ = Storsjön Edsbyn Deformation Zone, which was active by dextral traspression during this stage.

emplaced (cf. Koistinen et al. 2001). In Värmland, this magmatism seems to cover the whole area up to the Mylonite Zone in the west (Lindh & Gorbatschev 1984, Lindh & Persson 1990, Söderlund et al. 1999), while south of Lake Vänern a westward transition into more calc-alkaline rocks is recorded (Gorbatschev 1980, Berglund & Larson 1997, Gorbatschev & Bogdanova 2003). The latter represents a transition from TIB into juvenile 'Gothian' arc-related crust-forming rocks overlapping in time (cf. Åhäll & Larson 2000). In contrast, the alkali-rich TIB-2 and 3 rocks represent reworking of earlier rocks in a continental margin setting, where the precursors were probably both calc-alkaline and alkali-calcic.

Synthesis of tectonomagmatic models: The distribution of lithologies and ages among TIB-assigned rocks mark a shift from the last calc-alkaline arc-related crust formation (1.86–1.84 in central Sweden, and 1.84–1.82 Ga in southern Sweden) to partly coeval and successively younger (1.85–1.65 Ga) remelting of the crust. Massive mafic underplating in a convergent continental-margin setting caused remelting of this juvenile crust and produced the alkali-calcic, I- (to A-) type, crustal magmas of the TIB (1 to 3). The coeval development of minor metaluminous and late Svecofennian intrusions within the Svecofennian interior represents areas of comparatively (to TIB) less extensive underplating and accompanying heat flow. A similar development of subduction-related metaluminous (I-type) and peraluminous (S-type) granitoids within the continental interior of western North America, east of the coeval to somewhat older, more juvenile, Cordilleran batholiths was described by Miller & Barton (1990). Both types of the Jurassic to Tertiary interior plutonic suites are, like TIB, crustally derived, but from much older, Proterozoic crust. In agreement with the model presented here for TIB development, Karlstrom et al. (2001) concluded that long-lived continental-margin subduction of Andean type best explains the 1.8–1.0 Ga magmatism along the southern margin of Laurentia-Baltica.

During 1.86–1.83 Ga northwards (to north-northeast) convergence was probably dominant, resulting in the earliest reworking and magma formation along the early Svecofennian margin of south Bergslagen (TIB-0). Whether the simultaneous formation of the calc-alkaline Ljusdal Batholith further north was the result of a separate subduction in this area is unclear, although seismic data suggests remnants of south-dipping (Guggisberg et al. 1991), or north-dipping (Heikkinen & Luosto 2000) slabs. During 1.81–1.76 Ga roughly N-S convergence continued and produced TIB-1 magmatism with a general younging of SVB-rocks (and protoliths) southwards, from southern Bergslagen to Blekinge. In the south the geochemistry of the TIB-crust changes in character to more calc-alkaline and juvenile (Lund et al. 2001). The retreating, northward subduction thus created new, juvenile, calc-alkaline crust just prior to its reworking and consumption while forming TIB-1 in SE Sweden. The general tectonic regime was dextral tranpressional, as recorded by several major plastic, 1.82–1.78 Ga, shear zones within the Svecofennian rocks, from the 1.86–1.82 Ga marginal TIB-0 and coeval rocks in the south to at least the Hassela Shear Zone in the north (e.g. Högdahl & Sjöström 2001, Högdahl et al. 2001b, Beunk & Page 2001). Partly, the early stages of this deformation may have been accommodated by magmatic flow in the TIB (or coeval) intrusions.

However, between 1.81–1.76 Ga, east-directed subduction appears to have been active in the north to generate the northward continuation of TIB-1 rocks, particularly the extensive RGS and the TIB continuation below the Caledonides to northwestern Norway (cf. e.g. Gaál 1990, Nironen 1997, Weihed et al. 2002, Skår 2002). The northern TIB rocks represent a similar, mainly alkali-calcic reworking of early Svecofennian crust as is recorded for the SVB further south. These simultaneously active subduction directions may represent two intersecting plates (Fig. 72), as in the areas of present subduction in southeastern Asia (cf. e.g. Hall et al. 1995, Lee & Lawver 1995, Milsom 2001).

At c. 1.76 Ga the northwards convergence was inactivated and during 1.76–1.71 Ga little magmatic activity is recorded. After c. 1.71 Ga the continental margin subduction shifted and resumed with a direction essentially northeastwards, causing renewed crustal reworking and alkali-rich TIB activity (TIB-2 and 3) along the western margin of TIB-1. Further north, the dextral transpressive shearing resulting in NW-SE extension enhanced the voluminous, alkaline TIB-2 magmatism in the Dala-Rätan Provinces (Bergman et al. subm.). The end of TIB magmatism is marked by the transition to more juvenile, 1.70–1.65 Ga, calc-alkaline rocks further to the west, in the southern part of the Eastern Segment of the Southwest Scandianavian Domain.