Effective Methods for the Synthesis of *N*-Methyl β-Amino Acids from All Twenty Common α-Amino Acids Using 1,3-Oxazolidin-5-ones and 1,3-Oxazinan-6-ones

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N-Methyl β-amino acids are generally required for application in the synthesis of potentially bioactive modified peptides and other oligomers. Previous work highlighted the reductive cleavage of 1,3-oxazolidin-5-ones to synthesise *N*-methyl α-amino acids. Starting from α-amino acids, two approaches were used to prepare the corresponding *N*-methyl β-amino acids. First, α-amino acids were converted to *N*-methyl α-amino acids by the so-called '1,3-oxazolidin-5-one strategy', and these were then homologated by the *Arndt–Eistert* procedure to afford *N*-protected *N*-methyl β-amino acids derived from the 20 common α-amino acids. These compounds were prepared in yields of 23–57% (relative to *N*-methyl α-amino acid). In a second approach, twelve *N*-protected α-amino acids could be directly homologated by the *Arndt–Eistert* procedure, and the resulting β-amino acids were converted to the 1,3-oxazinan-6-ones in 30–45% yield. Finally, reductive cleavage afforded the desired *N*-methyl β-amino acids in 41–63% yield.

One sterically congested β-amino acid, 3-methyl-3-aminobutanoic acid, did give a high yield (95%) of the 1,3-oxazinan-6-one (**65**), and subsequent reductive cleavage gave the corresponding AIBN-derived *N*-methyl β-amino acid **61** in 71% yield (*Scheme 2*).

Thus, our protocols allow the ready preparation of all *N*-methyl β-amino acids derived from the 20 proteinogenic α-amino acids.

Introduction. – There is a large and rapidly growing body of research concerning β-amino acids, of which representative structures occur in numerous natural products [1–3]. β-Amino acids, as α-amino acid homologues and as precursors for β-lactams, are the subject of synthetic studies in the development of novel therapeutics and in the synthesis of various natural products. Especially two research groups, those of *Seebach* and *Gellman*, have contributed greatly in recent times to the body of knowledge about β-amino acids. Their work centres on two aspects of these compounds: *i*) the synthesis of β-amino acid derivatives [4–6] and *ii*) the incorporation of β-amino acids into oligomeric structures and delineation of general rules for the folding and 3D structure imposed by β-amino acids in these oligomers [7][8].

Of further note is the occurrence of such residues in antibiotics [9]. One critical residue is present, *e.g.*, in taxol, and the extensive elaboration of taxol analogues has been reviewed [10]. *Juaristi* has presented much discussion of many aspects of the biological activity of β-amino acids [11]. The high biological-activity potential of β-amino acid residues is exemplified by compounds such as bestatin [12] and amastatin [13], which are quite small compounds ($M_r < 500$ Da). Consequently, the development of libraries of β-amino acid derived structures, and the associated synthetic methods, is an active

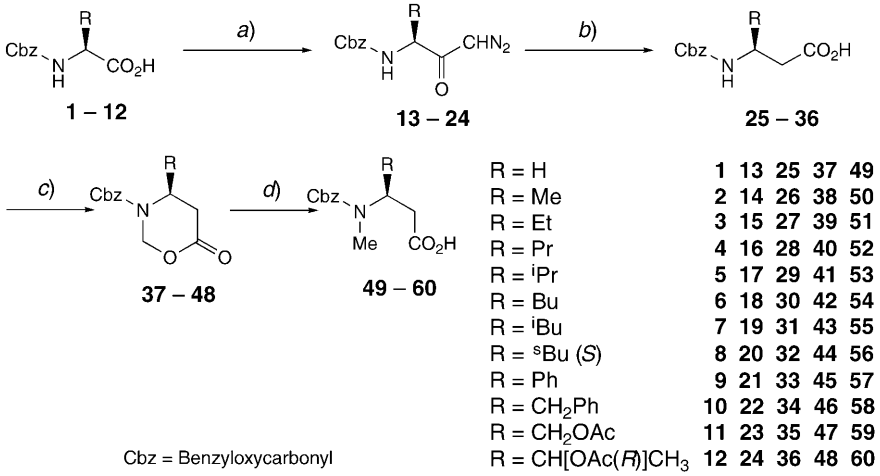
research area in which many compounds are being developed for incorporation into lead therapeutic peptide and peptidomimetic structures [5].

Our previous papers focussed on the methodology of synthesis of *N*-methyl α-amino acids (NMA) [14–17]. The chemistry described exploits intermediate 1,3-oxazolidin-5-ones to prepare the *N*-methyl derivatives of all 20 common α-amino acids. In the course of elaborating this methodology, its extension into the area of β-amino acids was an ingenuous and attractive one for the aforementioned reasons. We also know that β-amino acids, like *N*-methyl α-amino acid residues, will confer proteolytic resistance and increased lipophilicity on peptides in which they are incorporated [11]. We now wish to describe the results of extending the '1,3-oxazolidin-5-one strategy' to the synthesis of a range of *N*-methyl β-amino acids. It should be noted that some preliminary results of this project have already been published [18].

Two strategies were conceived for the synthesis of *N*-methyl β-amino acids. In previous work, *N*-protected α-amino acids were converted to 1,3-oxazolidin-5-ones, which, in turn, were used as precursors for *N*-methyl α-amino acids [15–17]. A similar approach to the β-compounds required the *N*-protected α-amino acids to be homologated to the corresponding *N*-protected β-amino acids. An established method for the homologation of carboxylic acids is the *Arndt–Eistert* reaction [19], which has also been applied to amino acids [20][21]. The original homologation procedure involves reaction of an acid chloride with diazomethane (CH_2N_2) to effect formation of a diazoketone. A *Wolff* rearrangement of the diazoketone then forms the homologated acid. However, the homologation of amino acids *via* acid chlorides is complicated by the formation of cyclic oxazolones [22] from the reaction of the acid chloride with the *N*-acyl protecting group. Carbamate-protected α-amino acids also undergo a cyclising side reaction with the acid chloride to form *N*-carboxyanhydrides [20]. This problem has been overcome by the use of the so-called 'mixed-anhydride method' [23], which allows the use of amides and urethanes. Thus, the *N*-protected β-amino acids from the homologation would then be converted into 1,3-oxazinan-6-ones, and subsequent reductive cleavage would yield the target *N*-methyl β-amino acids.

Results and Discussion. – 1. *Route* via *1,3-Oxazinan-6-ones.* The benzyl carbamates **2**–**12** were treated with ethyl chloroformate and *N*-methyl morpholine (NMM) to form the corresponding mixed anhydrides, which were reacted, in turn, with CH_2N_2 [24] to afford the corresponding diazoketones **14**–**24** in yields of 72–85% (*Scheme 1*). The formation of the diazoketones and their *Wolff* rearrangement to the β-amino acids **25**–**36** (50–90% yield) is known to proceed without racemisation of the asymmetric centre [25], except in the case of phenylglycine. The procedure employed in the present study is based on the work of *Müller et al.* [26] who reported: '*the base-free, Ag^+-catalysed Wolff rearrangement … proceeds smoothly within minutes at room temperature on sonication using an ultrasound cleaning bath*'. This method was used for all the *Wolff* rearrangements in this report. In addition, it was noted that previous workers employing Ag^+ salts for the *Wolff* rearrangement had used silver(I) oxide [27] and silver(I) benzoate [28]. More recently, the use of silver(I) trifluoroacetate was reported by *Seebach* and co-workers [29]. We found that, indeed, this reagent is best suited for the rearrangement, with the benefit that the trifluoroacetate anion can be easily removed during workup.

Scheme 1



a) 1. ClCOOEt, *N*-methylmorpholine (NMM); 2. CH_2N_2. *b*) CF_3COOAg, H_2O, sonication. *c*) $(CH_2O)_n$, camphorsulfonic acid (CSA; cat.), AcOH (cat.), benzene, reflux, 3 h. *d*) CF_3COOH (TFA), Et_3SiH, CH_2Cl_2.

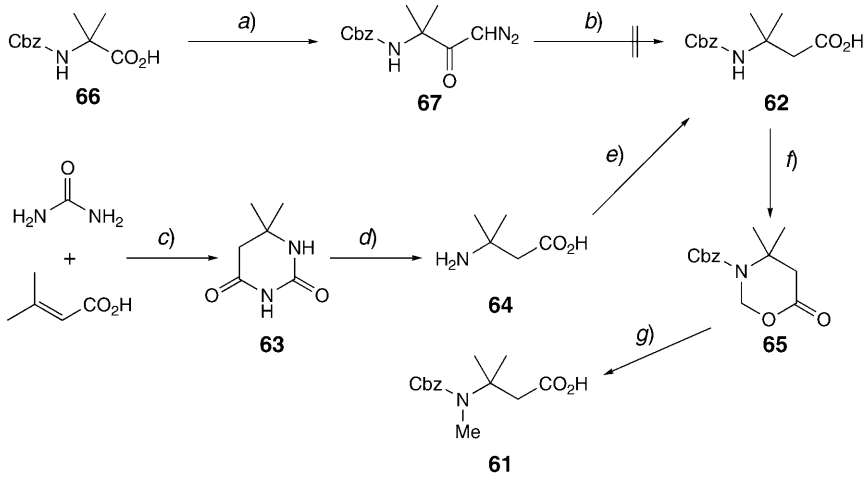
The β-amino acids **25**–**36** were next converted into the corresponding 1,3-oxazinan-6-ones **37**–**48** in 30–45% yield by reaction with paraformaldehyde in the presence of camphorsulfonic acid (CSA)/AcOH as catalysts. The 1,3-oxazinan-6-ones then underwent reductive cleavage when exposed to trifluoroacetic acid (TFA) and triethylsilane (Et_3SiH) to afford the desired *N*-methyl β-amino acids **49**–**60** in 41–63% yield.

The sterically congested *N*-methylated β-amino acid **61** was prepared by an alternative route *via* the '1,3-oxazinan-6-one pathway' (*Scheme 2*). We prepared the required β-amino acid **62** in high yield by a modification of a literature procedure [30]. Thus, urea and 3-methylbut-2-enoic acid were heated to effect a *Michael* addition, followed by dehydration to form the dihydropyrimidine dione **63**, which was hydrolysed to 3-amino-3-methylbutanoic acid (**64**) [30], and protected as the desired carbamate **62** [31]. Reaction of **62** then afforded 4,4-dimethyl-1,3-oxazinan-6-one (**65**) in 95% yield. Finally, reductive cleavage of this compound also proceeded well affording the target compound **61** in 71% yield.

The *N*-Cbz-protected (Cbz = benzyloxycarbonyl) aminoisobutyric acid (Aib) **66** could be converted into the diazoketone **67** (70% yield); however, the latter failed to form **62** in several attempted *Wolff* rearrangements [32]. Further, although accessible *via* the '1,3-oxazinan-6-one route' outlined in *Scheme 1*, the overall yields of *N*-methyl β-amino acids did not meet our expectations.

2. *Route* via *1,3-Oxazolidin-5-ones.* The second approach was to homologate the *N*-methyl α-amino acids as previously described [14][16]. Accordingly, the sequence depicted in *Scheme 3* was undertaken. A broad range of *N*-Cbz α-amino acids **1**–**12** and **68**–**70**, including some with side chains that we have not used before, were converted into the corresponding 1,3-oxazolidin-5-ones **71**–**85** by the established procedure [16]. Reductive cleavage with Et_3SiH and TFA provided the *N*-methyl α-amino

Scheme 2



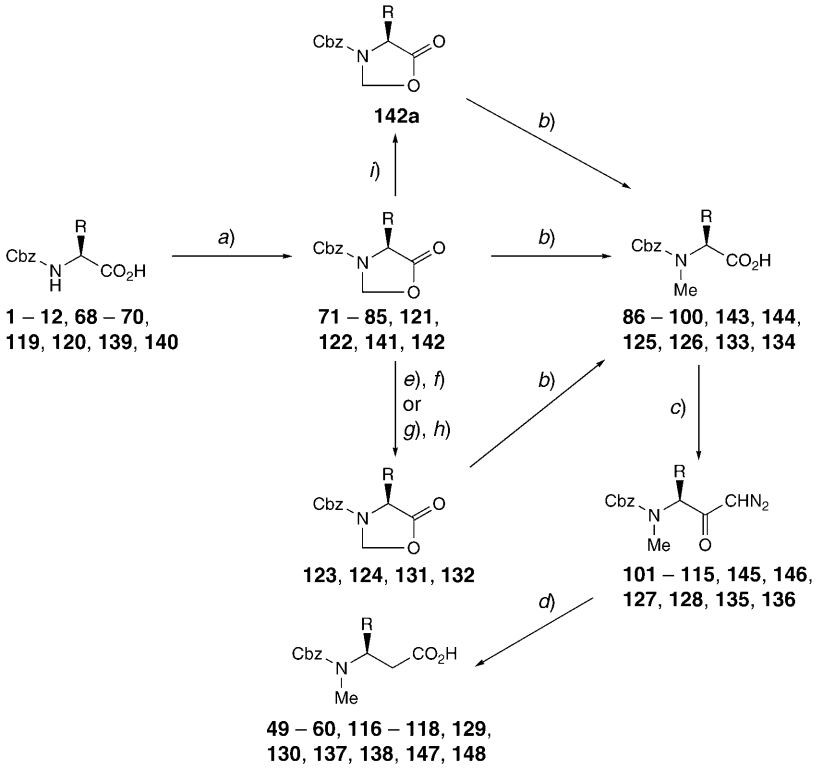
a) 1. ClCOOEt, NMM; 2. CH_2N_2. *b*) CF_3COOAg, H_2O, sonication. *c*) $(CH_2OH)_2$, 190°, 1 h. *d*) 1. aq. NaOH; 2. aq. HCl. *e*) Cbz-Succinimide, Et_3N, DMF. *f*) $(CH_2O)_n$, CSA (cat.), AcOH (cat.), benzene, reflux, 3 h. *g*) TFA, Et_3SiH, CH_2Cl_2.

acids **86**–**100**. All the acids were submitted to the same mixed-anhydride-forming conditions as in *Scheme 1*, and subsequent treatment with CH_2N_2 [24] gave the expected diazoketones **101**–**115**. *Wolff* rearrangements were performed by treatment of the diazoketones with CF_3CO_2Ag, which afforded the expected *N*-methyl β-amino acids **49**–**60** and **116**–**118** in 45–92% yield.

3. *Aspartic Acid, Glutamic Acid, Asparagine, and Glutamine.* The transformation of aspartic and glutamic acid varied from the basic sequence shown in *Scheme 3* due to interference by the side chain COOH groups. Aspartic acid (**119**) and glutamic acid (**120**) were converted under standard conditions to the oxazolidinones **121** and **122**, respectively, without protection of the side-chain functions, and the latter were isolated as their dicyclohexylamine (DCHA) salts. It was found that this expedient gave crystalline material that was easy to handle. Additionally, the benzylation reactions to provide the esters **123** and **124** gave the highest yields when the reaction was performed with the respective DCHA salts. Other lower-yielding methods to obtain the benzyl esters **123** and **124** involved reaction of Et_3N and benzyl bromide with the acids **121** and **122**, followed by reaction with either benzyl alcohol and dicyclohexylcarbodiimide (DCC) or with benzyl chloroformate, 4-(dimethylamino)pyridine (DMAP), and DCC. As shown in *Scheme 3*, the 1,3-oxazolidin-5-ones **123** and **124** were reductively cleaved to the *N*-methylated α-amino acids **125** and **126**, respectively. Then, the diazoketones **127** and **128** were prepared, and their *Wolff* rearrangement afforded the desired β-amino acids **129** and **130**.

The synthesis of the asparagine- and glutamine-derived β-amino acids also started from the corresponding carboxylic acids. Compounds **121** and **122** were treated with thionyl chloride ($SOCl_2$), and the resulting acid chlorides were quenched with 2 equiv. of dibenzylamine (Bn_2NH) to afford the tertiary amides **131** and **132**. These

Scheme 3



R = H	**1**	**71**	**86**	**101**	**49**	R = CH[OAc(*R*)]CH_3	**12**	**82**	**97**	**112**	**60**
R = Me	**2**	**72**	**87**	**102**	**50**	R = $(CH_2)_3$N(Phth)	**68**	**83**	**98**	**113**	**116**
R = Et	**3**	**73**	**88**	**103**	**51**	R = $(CH_2)_4$N(Phth)	**69**	**84**	**99**	**114**	**117**
R = Pr	**4**	**74**	**89**	**104**	**52**	R = CH_2(*N*-formyl-3-indolyl)	**70**	**85**	**100**	**115**	**118**
R = ^{i}Pr	**5**	**75**	**90**	**105**	**53**	R = CH_2CO_2H	**119**	**121**			
R = Bu	**6**	**76**	**91**	**106**	**54**	R = $CH_2CH_2CO_2H$	**120**	**122**			
R = ^{i}Bu	**7**	**77**	**92**	**107**	**55**	R = CH_2CO_2Bn		**123**	**125**	**127**	**129**
R = ^{s}Bu (*R*)	**8**	**78**	**93**	**108**	**56**	R = $(CH_2)_2CO_2Bn$		**124**	**126**	**128**	**130**
R = Ph	**9**	**79**	**94**	**109**	**57**	R = $CH_2CON(Bn)_2$		**131**	**133**	**135**	**137**
R = CH_2Ph	**10**	**80**	**95**	**110**	**58**	R = $(CH_2)_2CON(Bn)_2$		**132**	**134**	**136**	**138**
R = CH_2OAc	**11**	**81**	**96**	**111**	**59**	R = CH_2SBn	**139**	**141**	**143**	**145**	**147**
						R = $CH_2CH_2S(O)Me$	**140**	**142**			
						R = CH_2CH_2SMe		**142a**	**144**	**146**	**148**

Bn = benzyl, Phth = phthaloyl

a) $(CH_2O)_n$, CSA (cat.), toluene, reflux. *b*) TFA, Et_3SiH, CH_2Cl_2. *c*) 1. ClCOOEt, NMM; 2. CH_2N_2. *d*) CF_3COOAg, H_2O, sonication. *e*) $(C_6H_{11})_2NH$, Et_2O. *f*) BnBr, Et_3N, CH_2Cl_2. *g*) $SOCl_2$. H) Bn_2NH (2 equiv.), CH_2Cl_2. *i*) NH_4I, Me_2S, TFA, CH_2Cl_2.

amides were readily cleaved reductively to afford the *N*-methyl amino acids **133** and **134**, respectively. *Arndt–Eistert* homologation *via* the diazoketones **135** and **136** finally gave the expected β-amino acids **137** and **138** with ease.

4. *Cysteine and Methionine.* In the case of cysteine and methionine, we have already described methods for the conversion of the protected analogues **139** and **140** (*Scheme 3*) to the corresponding 1,3-oxazolidin-5-ones **141** and **142**, respectively [16]. These 1,3-oxazolidin-5-ones can be reductively cleaved to the *N*-methyl amino acids **143** and **144** [16]. The mixed-anhydride procedure afforded the diazoketones **145** and **146** in moderate yields (50 and 52%, resp.). Ag^+-Catalysed *Wolff* rearrangement of the diazoketones was uneventful in the case of cysteine, providing the *β*-*N*-methyl-*S*-benzyl-cysteine **147** in 87% yield. *Seebach* noted high yields in the *Wolff* rearrangements of methionine derivatives [33][34]. However, in our hands, the conversion of **146** to **148** proceeded in only 44% yield, which was attributed to catalyst poisoning by the sulfur functionality.

5. *Tyrosine. O*-Methyl-tyrosine (**149**; *Scheme 4*) was readily available by double methylation followed by ester hydrolysis of *N*-Cbz-tyrosine (**150**) [35][36]. This material formed the 1,3-oxazolidin-5-one **151** in good yield (80%). The latter was reductively cleaved to form the *N*,*O*-dimethyl-tyrosine **152** (84% yield; CHA salt). Formation of the diazoketone **153** proceeded uneventfully, and the *Wolff* rearrangement gave the expected *N*-methyl *β*-amino acid **154** in 87% yield as the *tert*-butylammonium salt.

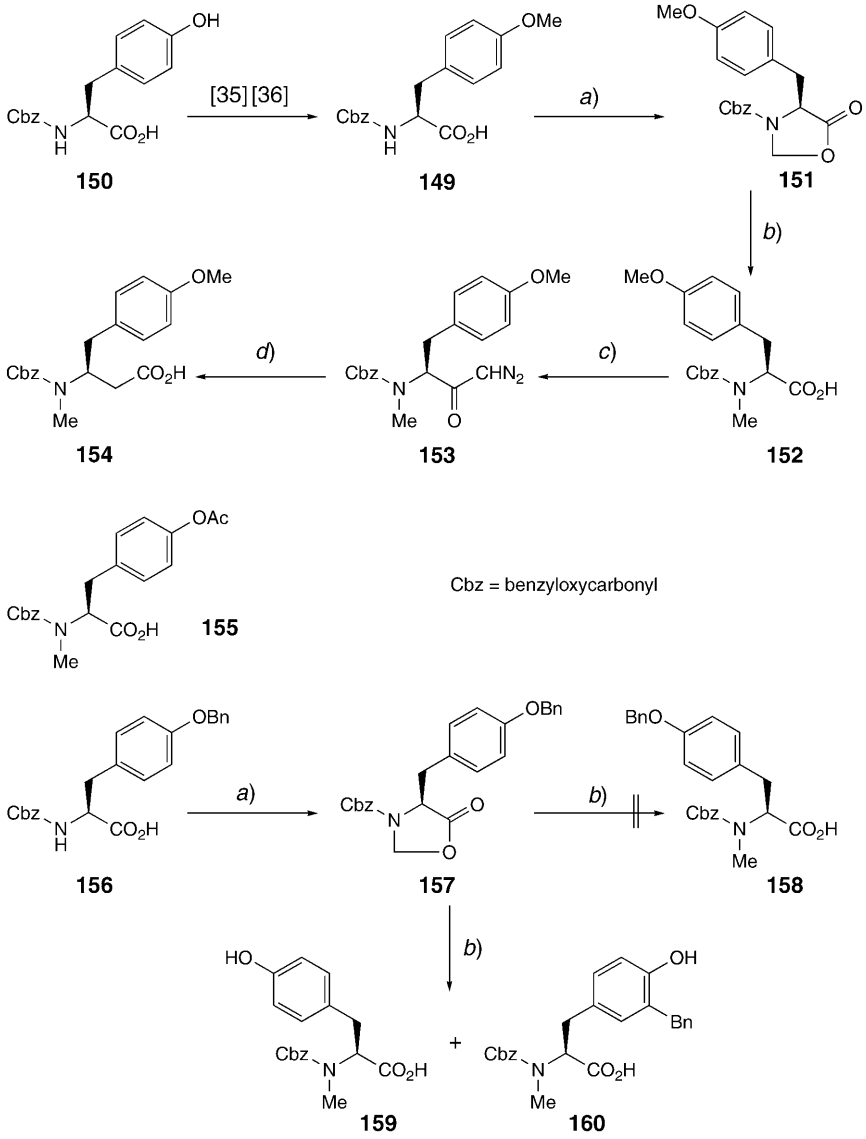
In one of our previous papers [16], we noted that tyrosine presents certain problems in terms of the desired 1,3-oxazolidin-5-one manipulations. This was also the case in the current *β*-amino acid sequence. Attempts were made to prepare the *β*-amino acid starting with **155**, but these reactions were low-yielding. Accordingly, *O*-benzyl-tyrosine (**156**) [37] was converted into the 1,3-oxazolidin-5-one **157** [38]. However, the subsequent reductive cleavage did not provide the *O*-benzyl-*N*-methyl-tyrosine **158**. Instead, the debenzylated compound **159** and the rearrangement product **160** [39] were isolated.

6. *Proline. Lin et al.* [40] converted L-proline to *N*-methyl-L-proline using aqueous formaldehyde in MeOH under hydrogenating conditions. In the present investigation, *N*-methyl-L-proline could not be directly homologated to the corresponding *β*-amino acid due to its low solubility. It was possible though to convert the carbamate **161** [31] to the diazoketone **162** [31] (*Scheme 5*). *Wolff* rearrangement then provided the *β*-amino acid **163** [31]. Lastly, the *N*-Cbz group was removed by hydrogenolysis over Pd/C, followed by *in situ* treatment with aqueous formaldehyde to effect *N*-methylation. Upon workup, the proline-derived *β*-amino acid **164** was isolated in 95% yield (isolated as the hydrochloride salt) [41].

7. *Arginine and Histidine.* In a previous paper [14], we described the preparation of the intermediate **98** in the synthesis of *N*-methyl-arginine. Thus, **98** was converted to the corresponding diazoketone **113** (*Scheme 6*). *Wolff* rearrangement in 1,4-dioxane/H_2O afforded the *β*-amino acid **116**, which was converted into the *t*-Bu ester **165**. Alternatively, **165** could be obtained directly from **113** by *Wolff* rearrangement in 1,4-dioxane/*t*-BuOH as solvent. The use of the *t*-Bu ester was advantageous for the ultimate deprotection step in that it suppressed aminolytic side reactions observed with the corresponding Me ester. Thus, ester **165** was treated with ethane-1,2-diamine to effect deprotection of the phthalimide moiety. The resulting primary amine **166** was then guanylated with the reagent **167** to afford the fully protected arginine-derived *β*-amino acid **168** in 62% yield (*Scheme 6*).

The synthesis of the *β*-*N*-methyl amino acid derived from histidine began with the *N*-methyl *α*-amino acid **169** (*Scheme 7*), which was described earlier [15][16]. Conver-

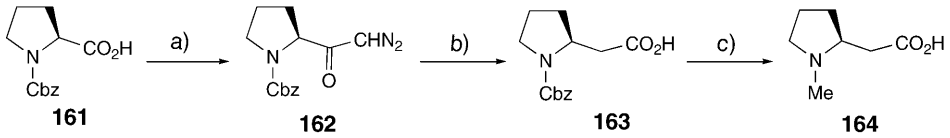
Scheme 4



a) $(CH_2O)_n$, CSA (cat.), toluene, reflux. *b*) TFA, Et_3SiH, CH_2Cl_2. *c*) 1. ClCOOEt, NMM; 2. CH_2N_2. *d*) CF_3COOAg, H_2O, sonication.

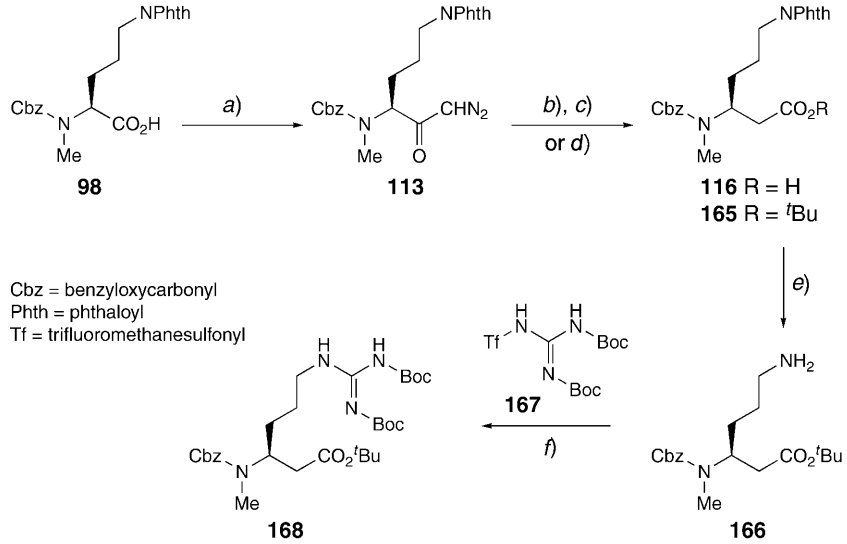
sion of **169** using ethyl chloroformate and the less-nucleophilic base 2,4,6-collidine (=2,4,6-trimethylpyridine) at $-20°$, followed by treatment with CH_2N_2 [24], gave the

Scheme 5



a) 1. ClCOOEt, NMM; 2. CH_2N_2. *b*) CF_3COOAg, H_2O, sonication. *c*) 1. H_2, Pd/C, MeOH; 2. aq. CH_2O, H_2, Pd/C.

Scheme 6



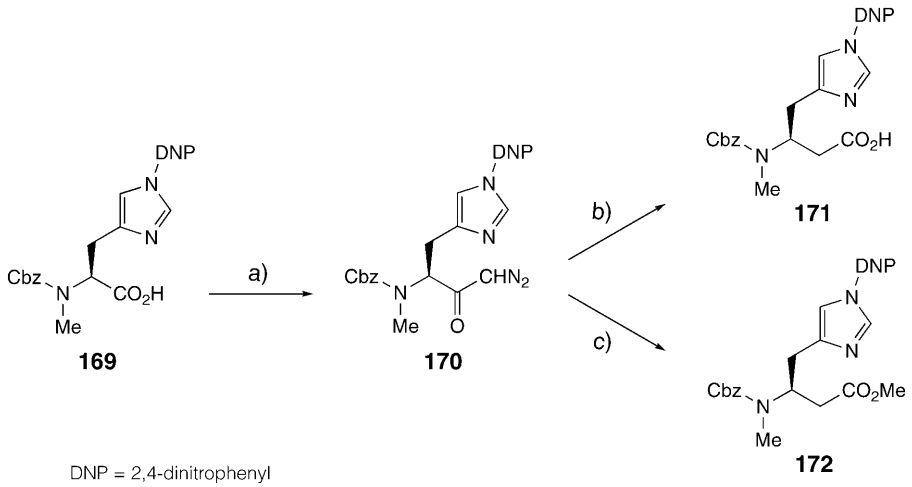
a) 1. ClCOOEt, NMM; 2. CH_2N_2. *b*) CF_3COOAg, H_2O/1,4-dioxane, sonication. *c*) 4-(Dimethylamino)pyridine (DMAP; cat.), anh. *t*-BuOH, $(Boc)_2O$. *d*) CF_3COOAg, 1,4-dioxane/anh. *t*-BuOH, sonication. *e*) Ethane-1,2-diamine/*t*-BuOH 4:1, 90°, 16 h. *f*) i-Pr_2NH, CH_2Cl_2.

desired diazoketone **170** in 50% yield[1]). *Wolff* rearrangement of **170** in the presence of 1,4-dioxane/H_2O then afforded the expected acid **171**, but this material was difficult to handle and purify. However, the expedient of using anhydrous 1,4-dioxane/MeOH instead of 1,4-dioxane/H_2O as solvent allowed the isolation of the Me ester **172** in 82% yield.

Conclusions. – An *Arndt–Eistert* approach has been successfully applied to the synthesis of *N*-methyl β-amino acids derived from the 20 common α-amino acids. As with our previous experience [16], the derivatives varied in their ease of synthesis. In general though, the solutions found for the synthesis of the corresponding *N*-methyl α-amino acids were mostly compatible with the *Arndt–Eistert* chemistry used to prepare the

[1]) When employing *N*-methylmorpholine as base, a dark-red colour was observed, probably due to removal (though unproven) of the 2,4-dinitrophenyl (DNP) protecting group, and the overall transformation was unsuccessful.

Scheme 7



a) 1. ClCOOEt, collidine, −20°; 2. CH_2N_2. *b*) CF_3COOAg, H_2O/1,4-dioxane, sonication. *c*) CF_3COOAg, MeOH/1,4-dioxane, sonication.

β-amino acids. Thereby, two approaches were studied. In the preferred '1,3-oxazolidin-5-one sequence', the *Arndt–Eistert* homologation was applied generally to previously described *N*-methyl α-amino acids [14–16], the desired *N*-methyl β-amino acids being obtained in yields of 23–57% from the *N*-protected *N*-methyl α-amino acids. Alternatively, the homologation could be applied to *N*-protected α-amino acids. The resulting β-amino acid products were then converted to 1,3-oxazinan-6-ones, which were reductively cleaved to the desired β-*N*-methyl amino acids, though in lower overall yield than in the case of the 1,3-oxazolidin-5-ones.

An interesting observation was that the ketene intermediates in the *Wolff* rearrangements to form the β-amino acids could be intercepted by various alcohols to afford Me and *t*-Bu esters, which solved some handling problems with certain compounds. It was also noted that the synthesis and reductive cleavage of 1,3-oxazinan-6-ones, though not efficient for mono-β-substituted β-amino acids, worked well for a β,β-dimethyl β-amino acid to afford the sterically congested β-amino acid **61**. This might well be a general phenomenon. While the yields of the β-amino acids prepared *via* the 1,3-oxazinan-6-one intermediates were not the highest, the 1,3-oxazinan-6-ones are versatile intermediates for the synthesis of more-complex and valuable β-amino acid derivatives and, thus, studies are continuing to optimise the yields of these compounds, as will be reported in due course.

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Experimental Part

General. AcOEt and hexane used for chromatography were distilled prior to use. All solvents were purified by distillation. For anh. solvents, procedures from *Perrin* and *Armarego* [42] were followed. Anh. CH_2Cl_2 was distilled and stored over *Linde*-type 4-Å molecular sieves. All other reagents and solvents were purified or dried as described in the literature [42]. The following compounds were prepared previously: **68** [43], **69** [44], **70** [45], and **150** [37]. All melting points (m.p.) are uncorrected and were recorded on a microscope hot-stage apparatus. Infrared (IR) spectra were recorded on an FT-IR spectrometer, using a diffuse reflectance accessory with KBr background; in cm^{-1}. NMR Chemical shifts δ and coupling constants J are reported in ppm (rel. to Me_4Si) and in Hz, resp. Electrospray mass spectra (ESI-MS) were obtained on a triple quadrupole mass spectrometer using H_2O/MeOH/AcOH 0:99:1:0 or 50:50:1 as the mobile phase. Low- and high-resolution mass spectra (l.s.i.m.s.) were recorded at the University of Tasmania by Dr. *Noel Davies* and co-workers.

General Procedure for the Preparation of the Diazoketones **14**–**24** *and* **67** *of* N-*(Benzyloxycarbonyl)-Protected* L-*Amino Acids.* The Cbz-protected L-α-amino acid (1 mmol) was dissolved in anh. THF (25 ml) and cooled to $-15°$. To this soln., ethyl chloroformate (1.05 mmol) and *N*-methylmorpholine (NMM, 1.05 mmol) were added successively, and the mixture was stirred for 15 min. Then, an anh. soln. of CH_2N_2 (5 mmol; CAUTION!) [24] in CH_2Cl_2 was added slowly, and the yellow soln. was allowed to warm to r.t. Stirring was continued until there was no acid remaining (TLC control). Excess CH_2N_2 was destroyed by addition of AcOH. The mixture was concentrated under reduced pressure, and the residue was taken up in AcOEt. The org. phase was washed successively with sat. aq. $NaHCO_3$ soln., 10% aq. citric acid, and brine. The org. layer was dried ($MgSO_4$), filtered, and evaporated to dryness *in vacuo*. The product was of sufficient purity to be directly used in the next reaction. An anal. sample was purified by flash chromatography (FC) for characterization. The anal. data of **14** [46], **16** [47], **17** [48], **18** [49], **19** [50], **20** [51], **21** [52], and **22** [51] were identical to those previously described.

Phenylmethyl [(1S)-3-Diazo-1-ethyl-2-oxopropyl]carbamate (**15**). Yield: 65%. Clear yellow oil. $[\alpha]_D^{19} = -19.4$ ($c = 1.7$, CH_2Cl_2). IR (NaCl): 3319, 3091, 2936, 2108, 1713, 1637, 1525, 1366, 1258, 1084, 738. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.27 (*s*, 5 H), 5.81–5.78 (*m*, 1 H); 5.40 (*m*, 1 H); 5.00 (*s*, 2 H); 4.17–4.11 (*m*, 1 H); 1.82–1.49 (*m*, 2 H); 0.90–0.85 (*t*, $J = 7.4$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 193.6; 155.8; 136.1; 128.2; 127.9; 127.7; 66.6; 58.9; 53.7; 25.3; 9.4. HR-MS: 262.1182 ($[M+H]^+$, $C_{13}H_{16}N_3O_3^+$; calc. 262.1186).

(2S)-4-Diazo-3-oxo-2-({[(phenylmethyl)oxy]carbonyl}amino)butyl Acetate (**23**). Yield: 85%. Pale-yellow solid. M.p. 66–69°. $[\alpha]_D^{18} = -3.9$ ($c = 2.8$, CH_2Cl_2). IR (KBr): 3325, 3093, 3034, 2956, 2112, 1811, 1789, 1742, 1639, 1524, 1455, 1368, 1230, 1045, 741, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.30 (*s*, 5 H); 5.85–5.82 (*m*, 1 H); 5.52 (*s*, 1 H); 5.07 (*s*, 2 H); 4.52–4.46 (*m*, 1 H); 4.26 (br. *s*, 2 H); 1.98 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 190.2; 170.5; 155.8; 135.9; 128.4; 128.2; 128.0; 67.1; 63.5; 56.8; 54.6; 13.8. HR-MS: 306.1092 ($[M+H]^+$, $C_{14}H_{16}N_3O_5^+$; calc. 306.1085).

(1R,2S)-4-Diazo-1-methyl-3-oxo-2-({[(phenylmethyl)oxy]carbonyl}amino)butyl Acetate (**24**). Yield: 76%. Clear yellow oil. $[\alpha]_D^{23} = +2.5$ ($c = 2.16$, CH_2Cl_2). IR (NaCl) 3324, 3093, 2985, 2111, 1789, 1730, 1640, 1522, 1370, 1234, 1027, 741, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.31 (*s*, 5 H); 5.72–5.69 (br. *s*, 1 H); 5.56 (*s*, 1 H); 5.31–5.28 (*m*, 1 H); 5.09 (*s*, 2 H); 4.35–4.28 (*m*, 1 H); 1.94 (*s*, 3 H); 1.22 (*d*, $J = 3.2$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 190.4; 169.5; 156.2; 135.9; 128.4; 128.2; 128.0; 69.5; 67.2; 61.0; 54.6; 20.8; 16.6. HR-MS: 320.1243 ($[M+H]^+$, $C_{15}H_{18}N_3O_5^+$; calc. 320.1247).

Phenylmethyl (3-Diazo-1,1-dimethyl-2-oxopropyl)carbamate (**67**). Yield: 70%. Pale-yellow oil. IR (NaCl): 3332, 2986, 2106, 1714, 1643, 1517, 1454, 1353, 1259, 1152, 1088, 857, 739. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.49 (br. *s*, 2 H); 5.06 (*s*, 2 H); 1.46 (*s*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 196.4; 154.7; 136.2; 128.5; 128.4; 128.2; 128.1; 68.0; 59.6; 52.2; 25.0. HR-MS: 262.1184 ($[M+H]^+$, $C_{13}H_{16}N_3O_3^+$; calc. 262.1192).

General Procedure for the Preparation of the N-*(Benzyloxycarbonyl)-Protected β-Amino Acids* **25**–**36** (as ammonium salts). The diazoketone (1 mmol) was dissolved in 50 ml of 1,4-dioxane/H_2O 9:1 (*v*/*v*). On addition of CF_3CO_2Ag (0.01 mmol), the mixture was sonicated in an ultrasound bath for 30 min or until no diazoketone remained, as indicated by TLC (AcOEt/hexane). The mixture was then concentrated *in vacuo*. The residue was dissolved in Et_2O and washed with 10% aq. citric acid. The org. layer

was extracted with sat. aq. $NaHCO_3$ soln. (3×). The combined aq. layers were acidified to pH 2 with dilute aq. HCl, and then re-extracted with AcOEt (3×). The combined org. extracts were dried ($MgSO_4$) and evaporated *in vacuo*. The residue was subjected to column chromatography (CC) for analysis, but for ease of handling the *tert*-butyl ammonium salt was made in the usual manner. The free acid was taken up in a minimum of anh. Et_2O and treated with *tert*-butyl amine (1.05 mmol). A precipitate slowly formed. Dropwise addition of hexane can aid the precipitation process. Stirring was generally continued for 16 h. The solid was suction-filtered, and the filter cake was washed with cold Et_2O/hexane to obtain the product as a white colorless solid. The anal. data of **26** [53], **28** [47], **29** [54], **31** [55], **33** [47], and **34** [47] were identical to those previously described.

*(3*S*)-3-({[(Phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**27**). Yield: 87%. Colourless solid. $[\alpha]_D^{19} = -9.56$ ($c = 0.3$, CH_2Cl_2). M.p. 110–113°. IR (KBr): 3329, 3064, 2966, 1696, 1537, 1451, 1286, 1247, 1097, 924, 733, 668. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 9.70–9.30 (*m*, 5 H); 5.21 (br. *s*, 1 H); 5.08 (*s*, 2 H); 3.90–3.85 (*m*, 1 H); 2.56 (*s*, 2 H); 1.60–1.55 (*m*, 2 H); 0.94–0.89 (*t*, $J = 7.1$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 176.8; 156.1; 136.4; 128.5; 128.1; 128.0; 66.8; 49.4; 38.4; 27.3; 10.5. HR-MS: 252.1232 ($[M+H]^+$, $C_{13}H_{18}NO_4^+$; calc. 252.1236).

*(3*S*)-3-({[(Phenylmethyl)oxy]carbonyl}amino)heptanoic Acid* (**30**). Yield: 67%. Colourless solid. M.p. 97–99°. $[\alpha]_D^{21} = -17.3$ ($c = 1.0$, CH_2Cl_2). IR (KBr): 3331, 2956, 2927, 1694, 1537, 1293, 1072, 731, 695. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.32 (*s*, 5 H); 5.28–5.25 (*m*, 1 H); 5.12–5.07 (*m*, 2 H); 3.94 (br. *s*, 1 H); 2.60–2.52 (*m*, 2 H); 1.52 (*s*, 2 H); 1.29 (*s*, 2 H); 0.90–0.82 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 176.6; 156.0; 136.4; 128.4; 128.1; 128.0; 66.7; 48.0; 38.8; 34.0; 28.2; 22.3; 13.8. HR-MS: 280.1557 ($[M+H]^+$, $C_{15}H_{22}NO_4^+$; calc. 280.1549).

*(3*R*,4*S*)-4-Methyl-3-({[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**32**). Yield: 70%. Clear, colourless oil. An anal. sample was converted to the *tert*-butylammonium salt: M.p. 102–106°. $[\alpha]_D^{20} = -7.1$ ($c = 1.0$, MeOH). IR (KBr): 3400, 2966, 2933, 2747 2635, 2626, 1698, 1632, 1552, 1401, 1253, 1028, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.27 (*m*, 5 H); 6.32 (*s*, 3 H); 6.12–6.09 (*m*, 1 H); 5.06–4.95 (*m*, 2 H); 3.78–3.71 (*m*, 1 H); 2.66 (*s*, 2 H); 1.59–1.00 (*m*, 3 H); 1.23 (*s*, 9 H); 0.82–0.80 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 178.5; 156.3; 136.8; 128.3; 127.8; 66.2; 53.4; 50.9; 39.3; 38.5; 27.7; 25.5; 15.2; 11.5. HR-MS: 280.1545 ($[M+H]^+$, $C_{15}H_{22}NO_4^+$; calc. 280.1549).

*(3*R*)-4-(Acetyloxy)-3-({[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**35**). Yield: 90%. Colourless solid. M.p. 111–112°. $[\alpha]_D^{23} = +0.73$ ($c = 0.83$, CH_2Cl_2). IR (KBr): 3352, 3144, 2585, 1720, 1692, 1540, 1447, 1377, 1272, 1217, 1067, 857, 638. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 10.20–9.80 (br. *s*, 1 H); 7.32 (*s*, 5 H); 5.48–5.46 (br. *s*, 1 H); 5.08 (*s*, 2 H); 4.23–4.12 (*m*, 3 H); 2.62 (*s*, 2 H); 2.01 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 175.6; 170.9; 155.8; 136.1; 128.5; 128.2; 128.1; 67.2; 65.0; 46.8; 35.5; 16.6. Anal. calc. for $C_{14}H_{17}N_2O_6$ (295.11): C 56.94, H 5.80, N 4.74; found: C 56.81, H 5.77, N 4.90.

*(3*R*,4*R*)-4-(Acetyloxy)-3-({[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**36**). Anal. data of *tert*-butylammonium salt. Yield: 85%. Colourless solid. M.p. 103–105°. $[\alpha]_D^{19} = +7.2$ ($c = 1.45$, CH_2Cl_2). IR (KBr): 3400, 2984, 2834, 2545, 2230, 2131, 1727, 1641, 1547, 1502, 1399, 1247, 1110, 1040, 753, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.81 (br. *s*, 3 H); 7.30 (*s*, 5 H); 5.79–5.75 (br. *s*, 1 H); 5.12–4.94 (*m*, 3 H); 4.05–4.00 (*m*, 1 H); 2.34–2.32 (*m*, 2 H); 1.91 (*s*, 3 H); 1.25 (*s*, 9 H); 1.18 (*d*, $J = 3.1$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 176.8; 170.3; 156.2; 136.6; 128.4; 128.0; 71.8; 66.5; 52.5; 50.9; 39.7; 27.8; 21.0; 17.1. Anal. calc. for $C_{19}H_{30}N_2O_6$ (382.45): C 59.67, H 7.91, N 7.32; found: C 59.47, H 8.04, N 7.40.

General Procedure for the Preparation of the 1,3-Oxazinan-6-ones **37**–**48** *and* **65** *of* N*-(Benzyloxycarbonyl)-Protected β-Amino Acids.* To the β-amino acid (1 mmol) in toluene (150 ml) was added camphorsulfonic acid (CSA; 0.1 mmol) and AcOH (0.1 mmol). The mixture was heated at 90° for 3–5 h, during which time an excess of paraformaldehyde was added in small portions down the condenser. The reaction was monitored by TLC until no trace of the acid remained. The mixture was hot-filtered through a glass frit, and the filtrate was concentrated *in vacuo*. The residue was taken up in AcOEt, the org. phase was washed with sat. aq. $NaHCO_3$ soln., dried ($MgSO_4$), and evaporated under reduced pressure. The residue was purified by CC (20–45% AcOEt/hexane) to afford the 1,3-oxazinan-6-one.

Phenylmethyl 6-Oxo-1,3-oxazinane-3-carboxylate (**37**). Yield: 36%. Colourless oil. IR (NaCl): 1764, 1714, 1454, 1276, 1153, 1012, 755, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.49 (*s*, 2 H); 5.18 (*s*, 2 H); 3.78 (*t*, $J = 10.8$, 2 H); 2.75 (*t*, $J = 10.8$, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 168.5; 153.6; 135.1; 128.3; 128.2; 127.9; 74.0; 67.9; 39.1; 29.3. HR-MS: 235.0644 (M^+, $C_{12}H_{13}NO_4^+$; calc. 235.0845).

Phenylmethyl (4S)-4-Methyl-6-oxo-1,3-oxazinane-3-carboxylate (**38**). Yield: 43%. Clear colourless oil. $[\alpha]_D^{20} = +143.4$ ($c = 1.0$, MeOH). IR (NaCl): 2900, 2800, 1766, 1713, 1454, 1266, 1159, 988, 771, 750, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.82–5.79 (br. *s*, 1 H); 5.16 (*s*, 2 H); 5.04 (*d*, $J = 10.5$, 1 H); 4.24 (br. *s*, 1 H); 2.81 (*dd*, $J = 6.7$, 16.0, 1 H); 2.47 (*dd*, $J = 10.3$, 16.0, 1 H); 1.30 (*d*, $J = 6.3$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 169.4; 153.8; 135.1; 128.3; 128.1; 127.8; 71.5; 67.8; 46.0; 36.8; 20.6. Anal. calc. for $C_{13}H_{15}NO_4$ (249.26): C 62.64, H 6.07, N 5.62; found: C 62.92, H 6.27, N 5.87.

Phenylmethyl (4S)-4-Ethyl-6-oxo-1,3-oxazinane-3-carboxylate (**39**). Yield: 35%. Clear colourless oil. $[\alpha]_D^{20} = +135.4$ ($c = 0.4$, MeOH). IR (NaCl): 2969, 2880, 1761, 1713, 1455, 1414, 1260, 1156, 1005, 770, 743, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.31 (*s*, 5 H); 5.82 (*d*, $J = 9.8$, 1 H); 5.14 (*s*, 2 H); 4.95 (*d*, $J = 10.7$, 1 H); 4.11–4.05 (*m*, 1 H); 2.78 (*dd*, $J = 7.0$, 16.1, 1 H); 2.47 (*dd*, $J = 10.0$, 16.1, 1 H); 1.76–1.54 (*m*, 2 H); 0.90–0.85 (*t*, $J = 11.2$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.5; 154.2; 135.2; 128.3; 128.1; 127.9; 127.7; 127.3; 72.0; 67.7; 50.7; 34.4; 27.5; 8.7. HR-MS: 263.1152 (M^+, $C_{14}H_{17}NO_4^+$; calc. 263.1158).

Phenylmethyl (4S)-6-oxo-4-propyl-1,3-oxazinane-3-carboxylate (**40**). Yield: 45%. Clear colourless oil. $[\alpha]_D^{20} = +135.5$ ($c = 0.4$, MeOH). IR (NaCl): 2960, 2934, 1762, 1713, 1414, 1261, 1244, 1156, 1109, 997, 772, 740, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.82 (*d*, $J = 9.9$, 1 H); 5.15 (*s*, 2 H); 4.96 (*d*, $J = 10.8$, 1 H); 4.19 (br. *s*, 1 H); 2.80 (*dd*, $J = 7.0$, 16.2, 1 H); 2.45 (*dd*, $J = 9.8$, 16.2, 1 H); 1.70–1.47 (*m*, 2 H); 1.33–1.26 (*m*, 2 H); 0.89 (*t*, $J = 10.8$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.5; 154.2; 135.2; 128.3; 128.1; 127.9; 127.8; 71.9; 67.8; 49.4; 36.8; 35.0; 17.8; 13.4. HR-MS: 277.1310 (M^+, $C_{15}H_{19}NO_4^+$; calc. 277.1314).

Phenylmethyl (4R)-4-(1-methylethyl)-6-oxo-1,3-oxazinane-3-carboxylate (**41**). Yield: 45%. Clear colourless oil. $[\alpha]_D^{20} = +147.8$ ($c = 1.0$, MeOH). IR (NaCl): 2964, 2800, 1761, 1714, 1455, 1262, 1155, 1130, 1009, 990, 772, 738, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.89 (br. *s*, 1 H); 5.16 (*s*, 2 H); 4.89 (*d*, $J = 10.8$, 1 H); 4.12–4.05 (*m*, 1 H); 2.72 (*dd*, $J = 7.0$, 16.1, 1 H); 2.54 (*dd*, $J = 10.5$, 16.1, 1 H); 2.10–1.99 (*m*, 1 H); 0.92–0.88 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 169.9; 154.7; 135.1; 128.3; 128.3; 127.8; 72.8; 67.9; 54.5; 31.7; 31.3; 18.2; 16.3. 277.1309 (M^+, $C_{15}H_{19}NO_4^+$; calc. 277.1314).

Phenylmethyl (4S)-4-Butyl-6-oxo-1,3-oxazinane-3-carboxylate (**42**).Yield: 38%. Clear colourless oil. $[\alpha]_D^{20} = +64.8$ ($c = 0.1$, MeOH). IR (NaCl): 2957, 2932, 2861, 1762, 1713, 1455, 1264, 1155, 1000, 771, 751, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.86 (*d*, $J = 9.9$, 1 H); 5.13 (*s*, 2 H); 4.98 (br. *s*, 1 H); 4.25–4.15 (*m*, 1 H); 2.83 (*dd*, $J = 7.0$, 16.2, 1 H); 2.46 (*dd*, $J = 9.7$, 16.2, 1 H); 1.78–1.48 (*m*, 2 H); 1.28 (br. *s*, 4 H); 0.86 (*t*, $J = 9.7$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.4; 154.2; 135.2; 128.3; 128.1; 128.0; 127.8; 71.9; 67.9; 49.6; 35.0; 34.4; 26.6; 22.0; 13.5. Anal. calc. for $C_{16}H_{21}NO_4$ (291.34): C 65.96, H 7.27, N 4.81; found: C 65.87, H 7.11, N 4.64.

Phenylmethyl (4S)-4-(2-Methylpropyl)-6-oxo-1,3-oxazinane-3-carboxylate (**43**). Yield: 31%. Clear colourless oil that crystallised on standing. M.p. 30–32°. $[\alpha]_D^{18} = +120.1$ ($c = 0.3$, MeOH). IR (NaCl): 2957, 2871, 1761, 1714, 1414, 1260, 1157, 998, 771, 752, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.85 (*d*, $J = 10.4$, 1 H); 5.16 (*s*, 2 H); 4.98 (*d*, $J = 10.7$, 1 H); 4.28 (*s*, 1 H); 2.86 (*dd*, $J = 7.2$, 16.2, 1 H); 2.40 (*dd*, $J = 9.2$, 16.2, 1 H); 1.68–1.52 (*m*, 2 H); 1.40–1.31 (*m*, 1 H); 0.90–0.88 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.3; 154.1; 135.1; 128.3; 128.2; 127.9; 71.7; 67.9; 47.9; 44.1; 35.5; 24.0; 22.6; 21.4. Anal. calc. for $C_{16}H_{21}NO_4$ (291.34): C 65.96, H 7.27, N 4.81; found: C 65.83, H 7.44, N 4.74.

Phenylmethyl (4R)-4-[(1S)-1-Methylpropyl]-6-oxo-1,3-oxazinane-3-carboxylate (**44**). Yield: 30%. Clear colourless oil. $[\alpha]_D^{20} = +111.6$ ($c = 0.5$, MeOH). IR (NaCl): 2964, 2934, 1762, 1714, 1455, 1261, 1158, 1133, 1001, 772, 742, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.90 (br. *s*, 1 H); 5.16 (*s*, 2 H); 4.91 (*d*, $J = 10.5$, 1 H); 4.14–4.08 (*m*, 1 H); 2.67–2.52 (*m*, 2 H); 1.93–1.86 (*m*, 1 H); 1.33–1.06 (*m*, 2 H); 0.90–0.87 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 170.1; 154.6; 135.1; 128.3; 128.1; 127.9; 127.7; 73.0; 67.9; 53.3; 37.8; 30.3; 25.1; 12.6; 11.2. Anal. calc. for $C_{16}H_{21}NO_4$ (291.34): C 65.96, H 7.27, N 4.81; found: C 66.14, H 7.41, N 4.64.

Phenylmethyl 6-Oxo-4-phenyl-1,3-oxazinane-3-carboxylate (**45**). Yield: 35%. Colourless solid. M.p. 70–74°. IR (KBr): 3039, 2931, 1763, 1704, 1407, 1267, 1144, 997, 877, 807, 754, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.36–7.24 (*m*, 10 H); 6.93 (br. *s*, 1 H); 6.05 (br. *s*, 1 H); 5.29 (*d*, $J = 10.2$, 1 H); 5.10 (*s*, 2 H); 3.07–2.79 (*m*, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 168.7; 145.5; 134.9; 128.8; 128.1; 127.9; 127.6; 124.9; 73.0; 67.9; 53.5; 37.1. Anal. calc. for $C_{18}H_{17}NO_4$ (311.33): C 69.44, H 5.50, N 4.50; found: C 69.43, H 5.61, N 4.42.

Phenylmethyl (4S)-6-Oxo-4-(phenylmethyl)-1,3-oxazinane-3-carboxylate (**46**). Yield: 40%. Clear colourless oil that crystallised on standing. M.p. 47–50°. $[\alpha]_D^{20} = +94.7$ ($c = 1.1$, MeOH). IR (NaCl): 3030, 2800, 1765, 1714, 1413, 1260, 1154, 1001, 833, 739, 700. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.37 (*s*, 5 H); 7.33–7.09 (*m*, 5 H); 5.76 (br. *s*, 1 H); 5.21 (*s*, 2 H); 4.66 (*d*, $J = 10.5$, 1 H); 4.39 (*m*, 1 H); 3.00–2.50 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.5; 154.0; 135.1; 129.3; 128.8; 128.4; 128.2; 127.9; 126.9; 72.2; 68.0; 50.6; 39.7; 33.7. HR-MS: 325.1219 (M^+, $C_{19}H_{19}NO_4^+$; calc. 325.1314).

Phenylmethyl (4R)-4-[(Acetyloxy)methyl]-6-oxo-1,3-oxazinane-3-carboxylate (**47**). Yield: 40%. Clear colourless oil that crystallised on standing. M.p. 63–64°. $[\alpha]_D^{19} = +101.0$ ($c = 0.2$, MeOH). IR (NaCl): 3065, 3035, 1765, 1744, 1715, 1415, 1265, 1238, 1157, 1045, 1002, 771, 753, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.82 (br. *s*, 1 H); 5.16 (*s*, 2 H); 5.04 (*d*, $J = 9.9$, 1 H); 4.42–4.40 (*m*, 1 H); 4.34–4.04 (*m*, 2 H); 2.76 (*d*, $J = 9.0$, 2 H); 2.02 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 170.0; 168.8; 153.9; 134.9; 128.3; 128.2; 127.9; 127.8; 72.6; 69.4; 64.1; 48.5; 31.5; 20.3. HR-MS: 308.1130 ($[M+H]^+$, $C_{15}H_{18}NO_6^+$; calc. 308.1134).

Phenylmethyl (4R)-4-[(1R)-1-(Acetyloxy)ethyl]-6-oxo-1,3-oxazinane-3-carboxylate (**48**). Yield: 43%. Clear colourless oil that crystallised on standing. M.p. 69–71°. $[\alpha]_D^{20} = +129.0$ ($c = 0.6$, MeOH). IR (NaCl): 2986, 1761, 1737, 1718, 1455, 1263, 1135, 1152, 1027, 993, 829, 755, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.85 (br. *s*, 1 H); 5.16 (*s*, 2 H); 5.05–4.99 (*m*, 2 H); 4.39 (br. *s*, 1 H); 2.77 (*dd*, $J = 7.7$, 16.3, 1 H); 2.60 (*dd*, $J = 9.5$, 16.3, 1 H); 1.96 (*s*, 3 H); 1.21 (*d*, $J = 6.1$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.6; 168.5; 154.6; 134.8; 128.3; 128.2; 128.0; 73.2; 70.8; 68.2; 51.9; 31.2; 20.5; 15.6. Anal. calc. for $C_{16}H_{19}NO_6$ (321.33): C 59.81, H 5.96, N 4.36; found: C 59.66, H 5.69, N 4.48.

Phenylmethyl 4,4-Dimethyl-6-oxo-1,3-oxazinane-3-carboxylate (**65**). Yield: 95%. Colourless solid. M.p. 70–71°. IR (KBr): 3030, 2970, 1769, 1712, 1410, 1359, 1312, 1265, 1116, 1026, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.29 (*s*, 5 H); 5.42 (*s*, 2 H); 5.10 (*s*, 2 H); 2.65–2.62 (*m*, 2 H); 1.46 (*s*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 170.0; 153.0; 135.4; 128.3; 128.1; 128.0; 127.8; 127.6; 72.8; 67.3; 54.7; 44.5; 26.7. HR-MS: 264.1231 ($[M+H]^+$, $C_{14}H_{18}NO_4^+$; calc. 264.1236).

General Procedure for the Preparation of the N-*Methyl β-Amino Acids* **49**–**60** *and* **61** *from 1,3-Oxazinan-6-ones.* The 1,3-oxazinan-6-one (1 mmol) was dissolved in the minimum volume of CH_2Cl_2/CF_3CO_2H 1:1 (*v*/*v*). Et_3SiH (3 mmol) was added, and the mixture was stirred for 24–48 h, until no 1,3-oxazinan-6-one remained (TLC control). Toluene was added to the soln., and the solvent was evaporated *in vacuo*. This procedure was repeated three times to remove traces of CF_3CO_2H. The residue was taken up in Et_2O and washed with sat. aq. $NaHCO_3$ soln. (3×). The combined aq. layers were washed with Et_2O. The aq. fraction was adjusted to pH 2 with dilute aq. HCl, and the aq. layers were re-extracted with AcOEt (3×). The combined org. phases were dried ($MgSO_4$) and evaporated under reduced pressure. When there was any trace of CF_3CO_2H, the product was purified by CC on a short plug of silica gel (5–10% MeOH/CH_2Cl_2). For analysis and ease of handling, the free acid could be converted to the *tert*-butylammonium salt in the usual manner. The free acid was taken up in the minimum volume of anh. Et_2O and treated with *t*-$BuNH_2$ (1.05 mmol). A precipitate slowly formed. Dropwise addition of hexane sometimes aided the precipitation process. Stirring was generally continued for 16 h. The precipitate was suction-filtered and washed with cold Et_2O/hexane to afford the desired product as a colourless solid.

3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic Acid (**49**). Yield: 50%. Clear colourless oil. Anal. data of dicyclohexylammonium salt: M.p. 116–119°. IR (KBr): 3438, 3028, 2936, 2853, 2807, 2521, 2420, 2363, 1698, 1636, 1556, 1397, 1305, 1200, 1137. ^{1}H-NMR (300 MHz, D_2O; rotamers): 7.32 (*s*, 5 H); 5.01 (*s*, 2 H); 3.45–3.41 (*m*, 2 H); 3.12–3.11 (*m*, 2 H); 2.77 (*s*, 3 H); 2.27 (*t*, $J = 10.8$, 2 H), 1.91–1.00 (*m*, 20 H). ^{13}C-NMR (75 MHz, D_2O): 180.2; 157.3; 136.2; 128.4; 127.9; 127.3; 67.1; 52.9; 45.9; 35.8; 35.5; 34.0; 33.7; 24.1; 23.6; 28.7. Anal. calc. for $C_{24}H_{38}N_2O_4$ (418.57): C 68.87, H 9.15, N 6.79; found: C 68.86, H 9.16, N 6.79.

(3S)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid (**50**). Yield: 50%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 101–106°. $[\alpha]_D^{20} = +11.0$ ($c = 3.0$, MeOH). IR (KBr): 2976, 2743, 2612, 2226, 1684, 1562, 1398, 1330, 1202, 1143, 1019, 737, 700. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.38 (*s*, 3 H); 7.31–7.24 (*m*, 5 H); 5.07 (*s*, 2 H); 4.57 (*q*, $J = 9.3$, 1 H); 2.78 (*s*, 3 H);

2.43–2.23 (*m*, 2 H); 1.27 (*s*, 9 H); 1.14 (*d*, $J=6.8$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.6; 155.7; 136.7; 128.7; 128.0; 127.8; 127.5; 127.4; 127.2; 66.5; 50.5; 49.4; 42.4; 28.2; 27.6; 17.6. Anal. calc. for $C_{17}H_{28}N_2O_4$ (324.42): C 62.94, H 8.70, N 8.64; found: C 62.87, H 8.74, N 8.70.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**51**). Yield: 50%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 92–97°. $[\alpha]_D^{18}=+1.3$ ($c=1.2$, MeOH). IR (KBr): 3417, 2973, 2915, 2834, 2746, 2634, 2545, 2433, 2379, 2227, 1697, 1645, 1560, 1450, 1143, 763, 736, 696. ^{1}H-NMR (300 MHz, D_2O; rotamers): 7.32–7.28 (*m*, 5 H); 5.10–4.98 (*m*, 2 H); 4.29–4.16 (*m*, 1 H); 2.68–2.63 (*m*, 3 H); 2.25 (*d*, $J=7.6$, 2 H); 1.45–1.37 (*m*, 2 H); 1.25 (*s*, 9 H); 0.67 (*t*, $J=10.9$, 3 H). ^{13}C-NMR (75 MHz, D_2O; rotamers): 179.8; 179.7; 158.0; 157.7; 136.3; 128.3; 127.8; 127.4; 127.1; 67.1; 66.9; 55.5; 51.5; 40.8; 40.6; 27.5; 27.3; 26.2; 24.4; 24.2; 9.6. Anal. calc. for $C_{18}H_{30}N_2O_4$ (338.22): C 63.88, H 8.93, N 8.28; found: C 63.84, H 8.78, N 8.29.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**52**). Yield: 41%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 96–100°. $[\alpha]_D^{18}=+4.3$ ($c=3.2$, MeOH). IR (KBr): 3440, 2959, 2500, 2240, 1694, 1553, 1457, 1403, 1336, 1218, 1145, 1001, 762, 702. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.31–7.28 (*m*, 5 H); 6.38 (*s*, 3 H); 5.10–5.06 (*m*, 2 H); 4.48 (*m*, 1 H); 2.77 (*s*, 3 H); 2.40–2.32 (*m*, 2 H); 1.48–1.44 (*m*, 2 H); 1.34–1.20 (*m*, 2 H); 1.27 (*s*, 9 H); 0.90–0.84 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.3; 156.3; 136.7; 128.0; 127.3; 127.1; 66.5; 53.5; 50.3; 40.8; 40.4; 34.2; 29.2; 28.8; 27.9; 19.0; 13.4. Anal. calc. for $C_{19}H_{32}N_2O_4$ (352.24): C 64.74, H 9.15, N 7.95; found: C 64.74, H 9.15, N 7.95.

*(3*S*)-4-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**53**). Yield: 63%. Anal. data of *tert*-butylammonium salt: M.p. 99–101°. $[\alpha]_D^{21}=-7.5$ ($c=1.1$, MeOH). IR (KBr): 3408, 2937, 2928, 2742, 2635, 2361, 2341, 2224, 1689, 1638, 1543, 1406, 1324, 969, 700, 672. ^{1}H-NMR (300 MHz, D_2O; rotamers): 7.29–7.21 (*m*, 5 H); 5.04–4.89 (*m*, 2 H); 3.93–3.83 (*m*, 1 H); 2.65–2.59 (*m*, 3 H); 2.44–2.10 (*m*, 2 H); 1.65–1.57 (*m*, 1 H); 1.20 (*s*, 9 H); 0.76–0.60 (*m*, 6 H). ^{13}C-NMR (75 MHz, D_2O; rotamers): 180.2; 180.1; 158.2; 157.7; 136.5; 136.3; 128.4; 128.3; 127.9; 127.5; 127.2; 67.2; 66.9; 60.6; 51.6; 38.8; 38.7; 29.9; 28.5; 26.3; 18.7; 18.6; 18.5. HR-MS: 278.1396 ([$M-H$]$^-$, $C_{15}H_{20}NO_4^-$; calc. 278.1392).

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)heptanoic Acid* (**54**). Yield: 57%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 88–91°. $[\alpha]_D^{21}=+5.5$ ($c=3.1$, MeOH). IR (KBr): 2927, 2636, 2550, 2236, 1687, 1640, 1542, 1424, 1410, 1345, 1212, 1129, 1115, 1032, 966, 768, 745, 700. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers: 7.31 (*s*, 8 H); 5.10–5.04 (*m*, 2 H); 4.48–4.43 (*m*, 1 H); 2.76 (*s*, 3 H); 2.40–2.25 (*m*, 2 H); 1.46 (*m*, 2 H); 1.35–1.20 (*m*, 4 H); 1.25 (*s*, 9 H); 0.83 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.4; 156.2; 136.8; 128.0; 127.3; 127.1; 66.5; 53.8; 50.0; 41.3; 40.8; 31.7; 28.2; 28.1; 22.0; 13.9. Anal. calc. for $C_{20}H_{34}N_2O_4$ (366.49): C 65.54, H 9.35, N 7.64; found: C 65.67, H 9.05, N 7.66.

*(3*S*)-5-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**55**). Yield: 58%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 97–101°. $[\alpha]_D^{18}=+7.5$ ($c=1.1$, MeOH). IR (KBr): 2927, 2628, 2549, 2227, 1690, 1638, 1539, 1408, 1321, 1218, 1118, 963, 753, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.30–7.26 (*m*, 5 H); 7.03 (*s*, 3 H); 5.13–5.04 (*s*, 2 H); 4.57 (*m*, 1 H); 2.76 (*s*, 3 H); 2.39–2.21 (*m*, 2 H); 1.46–1.44 (*m*, 2 H); 1.34–1.16 (*m*, 1 H); 1.26 (*s*, 9 H); 0.87–0.85 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.5; 156.1; 136.7; 127.9; 127.3; 127.1; 66.4; 51.9; 50.0; 41.6; 41.1; 28.0; 24.6; 22.9; 21.5. Anal. calc. for $C_{20}H_{34}N_2O_4$ (366.45): C 65.54, H 9.35, N 7.64; found: C 65.51, H 9.29, N 7.71.

*(3*R*,4*S*)-4-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**56**). Yield: 45%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 94–97°. $[\alpha]_D^{20}=-1.0$ ($c=2.0$, MeOH). IR (KBr): 3400, 2965, 2928, 2747, 2635, 2361, 2342, 2227, 1689, 1638, 1543, 1409, 1323, 1134, 699, 669. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.31–7.27 (*m*, 5 H); 6.40 (*s*, 3 H); 5.11–4.98 (*m*, 2 H); 4.21–4.13 (*m*, 1 H); 2.79 (*s*, 3 H); 2.50–2.31 (*m*, 2 H); 1.55 (*m*, 1 H); 1.41–1.00 (*m*, 2 H); 1.27 (*s*, 9 H); 0.89–0.80 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.6; 156.5; 136.8; 127.9; 127.3; 127.0; 66.5; 58.7; 50.0; 38.2; 38.0; 37.0; 36.5; 29.9; 29.2; 28.4; 25.3; 15.5; 10.5. Anal. calc. for $C_{20}H_{34}N_2O_4$ (366.49): C 65.54, H 9.35, N 7.64; found: C 65.74, H 9.07, N 7.77.

3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-phenylpropanoic Acid (**57**). Yield: 44%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 116–119°. IR (KBr): 3520, 3502, 3405, 2972, 2836, 2738, 2635, 2429, 2350, 2229, 1692, 1639, 1552, 1393, 1277, 759, 739, 698, 654. ^{1}H-NMR

(300 MHz, D_2O; rotamers): 7.30–7.19 (*m*, 10 H); 5.55 (*m*, 1 H); 5.06 (*s*, 2 H); 2.87–2.70 (*m*, 2 H); 1.26 (*s*, 9 H). ^{13}C-NMR (75 MHz, D_2O, 323 K; rotamers): 178.8; 157.5; 139.3; 136.2; 128.4; 127.9; 127.4; 126.6; 67.3; 56.5; 51.6; 39.0; 29.9; 29.1; 26.3. Anal. calc. for $C_{22}H_{30}N_2O_4$ (386.48): C 68.37, H 7.82, N 7.25; found: C 68.38, H 7.75, N 7.26.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-phenylbutanoic Acid* (**58**). Yield: 60%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 105–108°. $[\alpha]_D^{18} = -6.7$ ($c = 1.4$, MeOH). IR (KBr): 3428, 2979, 2633, 2538, 2466, 2242, 1687, 1620, 1404, 1339, 1204, 1119, 979, 742, 699. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.26–7.15 (*m*, 10 H); 7.06 (*s*, 3 H); 5.00–4.91 (*m*, 2 H); 4.61 (*m*, 1 H); 2.83–2.69 (*m*, 5 H); 2.50–2.41 (*m*, 2 H); 1.22 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.6; 155.7; 138.4; 136.7; 129.1; 128.7; 127.9; 127.8; 127.2; 127.0; 125.8; 66.5; 66.1; 56.4; 55.6; 50.1; 40.9; 40.3; 38.5; 38.1; 30.3; 29.6; 28.2. Anal. calc. for $C_{23}H_{32}N_2O_4$ (400.51): C 68.97, H 8.05, N 6.99; found: C 68.87, H 8.06, N 7.02.

*(3*R*)-4-(Acetyloxy)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**59**). Yield: 56%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 101–104°. $[\alpha]_D^{22} = +10.3$ ($c = 3.2$, MeOH). IR (KBr): 2974, 2897, 2838, 2743, 2632, 2555, 2361, 2342, 2217, 1739, 1702, 1686, 1562, 1432, 1389, 1327, 1236, 1121, 758, 701. ^{1}H-NMR (300 MHz, D_2O, 323 K; rotamers): 7.60 (*s*, 5 H); 5.31 (br. *s*, 2 H); 4.87 (br. *s*, 1 H); 4.36–4.28 (*m*, 2 H); 2.99 (*s*, 3 H); 2.61–2.57 (*m*, 2 H); 2.08 (*s*, 3 H); 1.54 (*s*, 9 H). ^{13}C-NMR (75 MHz, D_2O, 323 K; rotamers): 178.2; 173.7; 157.9; 136.6; 128.7; 128.2; 127.7; 67.5; 63.6; 53.2; 52.0; 36.9; 29.3; 26.6; 20.0. Anal. calc. for $C_{19}H_{30}N_2O_6$ (382.45): C 59.67, H 7.91, N 7.32; found: C 59.39, H 7.67, N 7.57.

*(3*R*,4*R*)-4-(Acetyloxy)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**60**). Yield: 50%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 94–98°. $[\alpha]_D^{20} = +28.4$ ($c = 3.2$, MeOH). IR (KBr): 3422, 2987, 2983, 2845, 2653, 2552, 2362, 2341, 1736, 1697, 1637, 1557, 1403, 1331, 1251, 1150, 743, 699. ^{1}H-NMR (300 MHz, D_2O; rotamers): 7.33–7.29 (*m*, 5 H); 5.10–5.06 (*m*, 1 H); 4.98–4.83 (*m*, 2 H); 4.37–4.32 (*m*, 1 H); 2.68–2.65 (*m*, 3 H); 2.31 (*d*, $J = 7.2$, 2 H); 1.77–1.66 (*m*, 3 H); 1.20 (*s*, 9 H); 1.06 (*d*, $J = 4.4$, 3 H). ^{13}C-NMR (75 MHz, D_2O, 323 K; rotamers): 178.5; 173.3; 157.9; 136.7; 128.7; 128.2; 127.9; 127.7; 71.3; 67.6; 67.3; 58.0; 51.9; 37.1; 37.0; 30.1; 29.6; 26.7; 20.4; 16.5. Anal. calc. for $C_{20}H_{32}N_2O_6$ (396.48): C 60.59, H 8.14, N 7.07; found: C 60.31, H 8.35, N 7.19.

3-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid (**61**). Anal. data of dicyclohexylammonium salt: Yield: 71%. Colourless solid. M.p. 102–105°. IR (KBr): 2937, 2859, 2538, 2454, 2361, 1685, 1622, 1544, 1457, 1391, 1337, 1267, 1120, 1074, 857, 741, 709. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 8.43 (*s*, 3 H); 7.27 (*s*, 5 H); 5.02–4.98 (*m*, 2 H); 2.94 (*s*, 3 H); 2.90–2.68 (*m*, 4 H); 1.93–1.12 (*m*, 26 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 176.7; 176.4; 155.8; 137.2; 128.2; 128.0; 127.9; 127.7; 127.5; 127.5; 66.3; 57.0; 52.4; 47.3; 31.8; 27.6; 26.4; 29.3; 25.1; 24.7. HR-MS: 264.1243 ($[M-H]^-$, $C_{14}H_{18}NO_4^-$; calc. 264.1241).

General Procedure for the Preparation of the 1,3-Oxazolidin-5-ones **71**–**85**, **141**, **142**, **151**, *and* **157**. These compounds were prepared according to the method of *Aurelio et al.* [14][16]. The anal. data of the following compounds were identical with those reported in the literature (for data of other compounds, see below): *phenylmethyl 5-oxo-1,3-oxazolidine-3-carboxylate* (**71**) [56], *phenylmethyl (4*S*)-5-oxo-4-methyl-1,3-oxazolidine-3-carboxylate* (**72**) [57], *phenylmethyl (4*S*)-5-oxo-4-ethyl-1,3-oxazolidine-3-carboxylate* (**73**) [58], *phenylmethyl (4*S*)-5-oxo-4-phenyl-1,3-oxazolidine-3-carboxylate* (**79**) [14], *phenylmethyl (4*S*)-5-oxo-4-(phenylmethyl)-1,3-oxazolidine-3-carboxylate* (**80**) [57], *phenylmethyl (4*S*)-4-[(acetyloxy)methyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**81**) [16], *phenylmethyl (4*S*)-4-[(1*R*)-1-(acetyloxy)ethyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**82**) [16], *phenylmethyl (4*S*)-4-[4-(1,3-dihydro-1,3-dioxo-2*H*-isoindol-2-yl)butyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**84**) [14], *phenylmethyl (4*S*)-4-[(1-formyl-1*H*-indol-3-yl)methyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**85**) [15][16], *phenylmethyl (4*R*)-5-oxo-4-[[(phenylmethyl)sulfanyl]methyl]-1,3-oxazolidine-3-carboxylate* (**141**) [16], *phenylmethyl (4*S*)-4-[2-(methylsulfinyl)ethyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**142**) [14][16], and *phenylmethyl (4*S*)-5-oxo-4-({4-[(phenylmethyl)oxy]phenyl}methyl)-1,3-oxazolidine-3-carboxylate* (**157**) [38].

*Phenylmethyl (4*S*)-5-Oxo-4-propyl-1,3-oxazolidine-3-carboxylate* (**74**). Yield: 66%. Clear colourless oil. $[\alpha]_D^{20} = +72.9$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 2962, 2931, 1801, 1716, 1415, 1358, 1254, 1131, 1047, 752, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.35 (*s*, 5 H); 5.51 (br. *s*, 1 H); 5.23–5.03 (*m*, 3 H); 4.31–4.28

(*m*, 1 H); 1.94–1.66 (*m*, 2 H); 1.38–1.29 (*m*, 2 H); 0.94–0.89 (*t*, *J* = 3.5, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 172.4; 152.8; 135.4; 128.6; 128.6; 128.2; 77.9; 67.8; 54.8; 32.7; 17.6; 13.6. HR-MS: 264.1240 ($[M+H]^+$, $C_{14}H_{18}NO_4^+$; calc. 264.1236).

*Phenylmethyl (4*S*)-4-(1-Methylethyl)-5-oxo-1,3-oxazolidine-3-carboxylate* (**75**). Yield: 90%. Colourless solid. M.p. 54°. $[\alpha]_D^{20} = +89.2$ (*c* = 1.3, CH_2Cl_2). IR (NaCl): 2966, 1801, 1715, 1414, 1360, 1239, 1125, 1052, 752, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.56 (br. *s*, 1 H); 5.21–5.13 (*m*, 3 H); 4.20 (br. *s*, 1 H); 2.34 (br. *s*, 1 H); 1.06–1.04 (*d*, *J* = 3.4, 3 H); 0.99 (*d*, *J* = 3.4, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.4; 153.6; 135.3; 128.6; 128.5; 128.2; 78.4; 67.9; 60.1; 31.2; 17.8; 17.7. Anal. calc. for $C_{14}H_{17}NO_4$ (263.29): C 63.87, H 6.51, N 5.32; found: C 63.89, H 6.47, N 5.28.

*Phenylmethyl (4*S*)-4-Butyl-5-oxo-1,3-oxazolidine-3-carboxylate* (**76**). Yield: 70%. Clear colourless oil. $[\alpha]_D^{20} = +81.1$ (*c* = 1.0, CH_2Cl_2). IR (NaCl): 2958, 2930, 1803, 1717, 1415, 1358, 1246, 1131, 1052, 750, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.50 (br. *s*, 1 H); 5.24–5.10 (*m*, 3 H); 4.30 (br. *s*, 1 H); 1.98–1.72 (*m*, 2 H); 1.29 (br. *s*, 4 H); 0.86 (br. *s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 172.4; 152.8; 135.4; 128.6; 128.5; 128.2; 77.9; 67.8; 54.9; 30.3; 26.2; 22.2; 13.7. HR-MS: 278.1395 ($[M+H]^+$, $C_{15}H_{20}NO_4^+$; calc. 278.1392).

*Phenylmethyl (4*S*)-4-(2-Methylpropyl)-5-oxo-1,3-oxazolidine-3-carboxylate* (**77**). Yield: 95%. Colourless solid. M.p. 63–64°. $[\alpha]_D^{20} = +79.2$ (*c* = 1.0, CH_2Cl_2). IR (NaCl): 2959, 1802, 1715, 1416, 1359, 1217, 1133, 1029. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.55 (br. *s*, 1 H); 5.22–5.11 (*m*, 3 H); 4.32 (br. *s*, 1 H); 1.78–1.67 (*m*, 3 H); 1.06–1.04, 0.92–0.90 (2*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 172.6; 153.1; 135.3; 128.6; 128.6; 128.3; 77.4; 68.0; 53.5; 39.5; 24.3; 22.4; 22.3. HR-MS: 278.1393 ($[M+H]^+$, $C_{15}H_{20}NO_4^+$; calc. 278.1392).

*Phenylmethyl (4*S*)-4-[(1*S*)-1-Methylpropyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**78**). Yield: 66%. Colourless solid. M.p. 66–68°. $[\alpha]_D^{23} = +97.7$ (*c* = 1.0, CH_2Cl_2). IR (NaCl): 2965, 1802, 1716, 1414, 1358, 1230, 1125, 1052, 761, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.53 (br. *s*, 1 H); 5.21–5.11 (*m*, 3 H); 4.25 (br. *s*, 1 H); 2.08 (br. *s*, 1 H); 1.63–1.35 (*m*, 2 H); 0.94–0.92 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.1; 153.1; 135.3; 128.5; 128.4; 128.1; 78.2; 67.8; 58.9; 37.8; 24.8; 14.5; 11.6. Anal. calc. for $C_{15}H_{19}NO_4$ (277.32): C 64.97, H 6.91, N 5.05; found: C 64.93, H 7.01, N 5.03.

*Phenylmethyl (4*S*)-4-[3-(1,3-Dihydro-1,3-dioxo-2*H*-isoindol-2-yl)propyl]-5-oxo-1,3-oxazolidine-3-carboxylate* (**83**). The anal. data were identical with those reported in [59]. Yield: 70%. Clear colourless oil. $[\alpha]_D^{24} = +52.9$ (*c* = 0.88, CH_2Cl_2). IR (NaCl): 2928, 1801, 1772, 1712, 1398, 1247, 1129, 1037, 749, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.81–7.67 (*m*, 4 H); 7.31 (*s*, 5 H); 5.50 (br. *s*, 1 H); 5.21–5.08 (*m*, 3 H); 4.33 (br. *s*, 1 H); 3.66 (br. *s*, 2 H); 2.01–1.71 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.8; 168.1; 152.8; 135.2; 133.9; 131.91; 129.0; 128.6; 128.5; 128.2; 123.2; 77.8; 67.9; 54.4; 28.02; 23.8. HR-MS: 409.1387 ($[M+H]^+$, $C_{22}H_{21}N_2O_6^+$; 409.1400).

*Phenylmethyl (4*S*)-4-{[4-(Methyloxy)phenyl]methyl}-5-oxo-1,3-oxazolidine-3-carboxylate* (**151**). Yield: 80%. Colourless solid. M.p. 64–66°. $[\alpha]_D^{20} = 182.0$ (*c* = 2.4, CH_2Cl_2). IR (KBr): 3033, 2958, 2914, 2837, 1800, 1715, 1613, 1513, 1417, 1249, 1125, 1051, 763, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.38 (*s*, 5 H); 7.05–6.95 (*m*, 2 H); 6.74 (*d*, *J* = 8.3, 2 H); 5.27–5.18 (*m*, 3 H); 4.49 (br. *s*, 1 H); 4.28–4.26 (*m*, 1 H); 3.74 (*s*, 3 H); 3.50–3.00 (*m*, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.9; 158.9; 152.4; 152.0; 135.5; 125.9; 130.6; 128.6; 128.5; 128.4; 114.1; 78.0; 77.8; 67.7; 56.4; 55.1; 35.3; 34.1. HR-MS: 341.1267 (M^+, $C_{19}H_{19}NO_5^+$; calc. 341.1263).

General Procedure for the Preparation of the N*-Methyl α-Amino Acids* **86**–**100**, **125**, **126**, **133**, **134**, **143**, **152**, **158**, **159**, *and* **169**. These compounds were prepared according to the procedure of *Aurelio et al.* [16]. The anal. data of the following compounds were identical with those reported in the literature (for other data, see below): *(methyl{[(phenylmethyl)oxy]carbonyl}amino)acetic acid* (**86**) [60], *(2*S*)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic acid* (**88**) [61], *(2*S*)-2-(methyl{[(phenylmethyl)-oxy]carbonyl}amino)pentanoic acid* (**89**) [62], *(2*S*)-3-methyl-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic acid* (**90**) [63], *(2*S*)-4-methyl-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic acid* (**92**) [64], *(2*S*)-(methyl{[(phenylmethyl)oxy]carbonyl}amino)(phenyl)ethanoic acid* (**94**) [14], *(2*S*)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-phenylpropanoic acid* (**95**) [64], *(2*S*)-3-(acetyloxy)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic acid* (**96**) [16], *(2*S*,3*R*)-3-(acetyloxy)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic acid* (**97**) [16], *(2*S*)-6-(1,3-dioxo-1,3-dihydro-2*H*-isoindol-2-yl)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic acid* (**99**) [14], *(2*S*)-3-(1-formyl-1*H*-

indol-3-yl)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic acid (**100**) [15][16], *(2*S*)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-oxo-4-[(phenylmethyl)oxy]butanoic acid* (**125**) [14], *(2*R*)-2-({2-oxo-2-[(phenylmethyl)oxy]ethyl}amino)-3-[(phenylmethyl)sulfanyl]propanoic acid* (**143**) [16], (2*S*)*-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-(methylsulfanyl)butanoic acid* (**144**) [16], *(2*S*)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-[4-[(phenylmethyl)oxy]phenyl}propanoic acid* (**158**) [66], *(2*S*)-3-(4-hydroxyphenyl)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic acid* (**159**) [14], and *(2*S*)-3-[1-(2,4-dinitrophenyl)-1*H*-imidazol-4-yl]-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic acid* (**169**) [16].

*(2*S*)-2-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic Acid* (**87**). Yield: 89%. Colourless solid. M.p. 54–56°. $[\alpha]_D^{23} = -20.0$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 3446, 3034, 2947, 1740, 1698, 1456, 1404, 1319, 1211, 1162, 1096, 738, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 9.62 (br. *s*, 1 H); 7.33–7.31 (*m*, 5 H); 5.14 (*s*, 2 H); 4.91–4.71 (*m*, 1 H); 2.90 (*s*, 3 H); 1.45–1.42 (*d*, $J = 3.9$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 177.0; 156.8; 156.1; 136.3; 128.4; 128.0; 128.8; 67.6; 54.2; 30.9; 30.4; 15.0; 14.5. HR-MS: 238.1071 ($[M+H]^+$, $C_{12}H_{16}NO_4^+$; calc. 238.1079).

*(2*S*)-2-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**91**). Yield: 75%. Clear colourless oil. $[\alpha]_D^{21} = -26.4$ ($c = 1.8$, CH_2Cl_2). IR (NaCl): 3440, 3034, 2958, 1705, 1681, 1456, 1403, 1366, 1212, 1158, 1113, 735, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 10.74 (*s*, 1 H); 7.36–7.31 (*m*, 5 H); 5.22–5.10 (*s*, 2 H); 4.88–4.63 (*m*, 1 H); 2.91–2.89 (*s*, 3 H); 2.03–1.72 (*m*, 2 H); 1.38–1.24 (*m*, 4 H); 0.93–0.86 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 176.6; 176.3; 157.3; 156.6; 136.2; 136.0; 128.3; 127.9; 127.6; 127.5; 67.6; 58.2; 30.6; 30.1; 28.2; 28.0; 27.9; 21.9; 13.7. Anal. calc. for $C_{15}H_{21}NO_4$ (279.33): C 64.50, H 7.58, N 5.01; found: C 64.45, H 7.52, N 4.97.

*(2*S*,3*S*)-3-Methyl-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**93**). Yield: 78%. Clear colourless oil. $[\alpha]_D^{21} = -52.0$ ($c = 1.7$, CH_2Cl_2). IR (NaCl): 3440, 3034, 2967, 1736, 1702, 1675, 1457, 1401, 1340, 1259, 1152, 1123, 735, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 8.78 (*s*, 1 H); 7.34 (*s*, 5 H); 5.16 (*s*, 2 H); 4.57–4.41 (*m*, 1 H); 2.93 (*s*, 3 H); 2.03–1.99 (*m*, 1 H); 1.42–0.85 (*m*, 8 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 175.4; 157.3; 156.6; 136.1; 128.4; 128.0; 127.7; 67.8; 63.1; 62.9; 33.3; 30.7; 25.0; 15.7; 10.5; 10.4. HR-MS: 280.1546 ($[M+H]^+$, $C_{15}H_{22}NO_4^+$; calc. 280.1549).

*(2*S*)-5-(1,3-Dihydro-1,3-dioxo-2*H*-isoindol-2-yl)-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-pentanoic Acid* (**98**). Yield: 63%. Clear colourless oil. $[\alpha]_D^{21} = 0.0$ ($c = 1.2$, CH_2Cl_2). IR (NaCl): 3440, 2958, 1709, 1653, 1456, 1398, 720, 665. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.84–7.70 (*m*, 4 H); 7.34–7.28 (*m*, 5 H); 5.13 (*s*, 2 H); 4.84–4.70 (*m*, 1 H); 3.73–3.65 (*m*, 2 H); 2.87 (*s*, 3 H); 2.08–1.68 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 175.8; 168.4; 157.3; 156.4; 136.2; 132.0; 134.0; 128.5; 128.0; 127.9; 127.8; 123.3; 67.8; 58.2; 58.0; 37.2; 37.1; 31.1; 30.8; 25.9; 25.7; 25.3. HR-MS: 411.1561 ($[M+H]^+$, $C_{22}H_{23}N_2O_6^+$; calc. 411.1556).

*(2*S*)-2-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-oxo-5-[(phenylmethyl)oxy]pentanoic Acid* (**126**). Yield: 81%. Colourless oil. $[\alpha]_D^{21} = -21.1$ ($c = 0.57$, CH_2Cl_2). IR (NaCl): 3440, 3033, 2952, 1736, 1705, 1455, 1401, 1319, 1213, 1168, 738, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 8.24 (*s*, 1 H); 7.33–7.28 (*m*, 10 H); 5.13–5.05 (*m*, 4 H); 4.80–4.65 (*m*, 1 H); 2.86 (*s*, 3 H); 2.41–2.08 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 175.5; 172.4; 172.3; 156.1; 156.2; 136.2; 136.6; 128.2; 128.4; 128.0; 127.7; 67.7; 66.6; 58.3; 58.1; 31.7; 31.2; 30.7; 30.5; 24.0; 23.7. HR-MS: 386.1602 ($[M+H]^+$, $C_{21}H_{24}NO_6^+$; calc. 386.1604).

*(2*S*)-4-[Bis(phenylmethyl)amino]-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-oxobutanoic Acid* (**133**). Yield: 62%. Colourless solid. M.p. 129–132°. $[\alpha]_D^{20} = -4.8$ ($c = 1.2$, CH_2Cl_2). IR (KBr): 3065, 3031, 2933, 1735, 1700, 1652, 1604, 1453, 1214, 1154, 733, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 9.90 (*s*, 1 H); 7.34–7.06 (*m*, 15 H); 5.15–4.31 (*m*, 7 H); 3.28–2.82 (*m*, 5 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 174.2; 174.0; 171.3; 171.0; 156.2; 155.6; 136.3; 136.0; 135.6; 128.7; 128.6; 128.4; 128.2; 127.8; 127.5; 127.2; 126.3; 126.0; 67.4; 67.2; 59.1; 58.0; 49.9; 49.7; 48.5; 48.3; 35.6; 35.4; 34.0; 33.4. HR-MS: 460.1989 (M^+, $C_{27}H_{28}N_2O_5^+$; calc. 460.1998).

*(2*S*)-5-[Bis(phenylmethyl)amino]-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-oxopentanoic acid* (**134**). Yield: 90%. Colourless solid. $[\alpha]_D^{16} = -8.7$ ($c = 2.0$, CH_2Cl_2). IR (KBr): 3064, 3031, 2942, 1733, 1703, 1650, 1605, 1453, 1361, 1212, 1171, 734, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 10.35 (*s*, 1 H); 7.33–7.04 (*m*, 15 H); 5.10–5.08 (*m*, 2 H); 4.81–4.33 (*m*, 5 H); 2.87–2.84 (*m*, 3 H); 2.57–2.01 (*m*, 4 H).

^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 173.2; 172.7; 157.2; 156.9; 136.4; 135.9; 135.4; 128.7; 128.3; 128.1; 128.0; 127.7; 127.5; 127.3; 126.0; 67.3; 58.4; 49.6; 48.4; 31.2; 29.7; 29.2; 24.3. HR-MS: 475.2235 ($[M+H]^+$, $C_{28}H_{31}N_2O_5^+$; calc. 475.2233).

(2S)-3-[4-(Methyloxy)phenyl]-2-(methyl[[(phenylmethyl)oxy]carbonyl]amino)propanoic Acid (**152**) [65]. Yield: 84%. Clear colourless oil. Anal. data of cyclohexylammonium salt: M.p. 96–102°. $[\alpha]_D^{17} = -27.1$ ($c = 1.3$, CH_2Cl_2). IR (KBr): 3062, 2937, 2859, 2660, 2565, 1696, 1633, 1611, 1584, 1513, 1365, 1313, 1247, 1136, 1036, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.73 (*s*, 3 H); 7.39–6.69 (*m*, 9 H); 5.17–4.80 (*m*, 2 H); 4.74–4.64 (*m*, 1 H); 3.74 (*s*, 3 H); 3.30–2.90 (*m*, 2 H); 2.85–2.78 (*m*, 3 H); 1.93–1.10 (*m*, 11 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 176.5; 158.1; 156.9; 137.1; 131.2; 129.7; 128.5; 128.1; 127.7; 127.3; 113.8; 66.8; 63.1; 55.2; 50.2; 35.0; 31.9; 31.4; 24.9; 24.5. HR-MS: 344.1500 ($[M+H]^+$, $C_{19}H_{22}NO_5^+$; calc. 344.1498).

General Procedure for the Preparation of the N*-Methyl Diazoketones* **101**–**115**, **127**, **128**, **135**, **136**, **145**, **146**, and **153**. To a soln. of the *N*-CBz-protected *N*-methyl α-L-amino acid (1 mmol) in anh. THF (5 ml) at −15° were added successively ethyl chloroformate (1.05 mmol) and *N*-methylmorpholine (NMM; 1.05 mmol). The mixture was stirred for 15 min, and then treated dropwise with an anh. soln. of CH_2N_2 (5 mmol; CAUTION!) [24] in CH_2Cl_2. The yellow soln. was allowed to warm to r.t., and stirring was continued until there was no acid remaining (TLC control). Excess CH_2N_2 was destroyed by addition of AcOH. The mixture was concentrated under reduced pressure, and the residue was taken up in AcOEt. The org. phase was washed successively with sat. aq. $NaHCO_3$ soln., 10% aq. citric acid soln., and brine. The org. layer was dried ($MgSO_4$) and evaporated to dryness *in vacuo*. The product was of sufficient purity to be used directly in the following reaction.

Phenylmethyl (3-Diazo-2-oxopropyl)methylcarbamate (**101**). Yield: 65%. Clear yellow oil. IR (KBr): 2967, 2109, 1743, 1703, 1456, 1362, 1225, 1146, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 5 H); 5.33–5.23 (*m*, 1 H); 5.12 (*s*, 2 H); 3.98–3.94 (*m*, 2 H); 2.96 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 190.8; 156.6; 136.3; 128.4; 128.0; 127.9; 127.8; 127.7; 67.5; 56.3; 50.5; 36.1; 35.4. HR-MS: 248.1035 ($[M+H]^+$, $C_{12}H_{14}N_3O_3^+$; calc. 248.1035).

Phenylmethyl (3-Diazo-1-methyl-2-oxopropyl)methylcarbamate (**102**). Yield: 70%. Clear yellow oil. $[\alpha]_D^{18} = -148.8$ ($c = 1.1$, CH_2Cl_2). IR (NaCl): 3091, 2985, 2944, 2107, 1741, 1700, 1647, 1356, 1307, 1162, 770, 753, 738, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.28 (*s*, 5 H); 5.36–5.25 (*m*, 1 H); 5.09 (*s*, 2 H); 4.77–4.56 (*m*, 1 H); 2.78 (*s*, 3 H); 1.26 (*d*, $J = 7.2$, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.9; 156.1; 155.5; 136.0; 128.1; 127.8; 127.5; 67.2; 58.5; 57.7; 53.1; 30.8; 29.3; 13.3; 12.7. HR-MS: 262.1183 ($[M+H]^+$, $C_{13}H_{16}N_3O_3^+$; calc. 262.1192).

Phenylmethyl (3-Diazo-1-ethyl-2-oxopropyl)methylcarbamate (**103**). Yield: 80%. Clear yellow oil. $[\alpha]_D^{19} = -194.4$ ($c = 1.4$, CH_2Cl_2). IR (NaCl): 3067, 2984, 2944, 2107, 1741, 1700, 1647, 1356, 1307, 1162, 770, 753, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.34 (*s*, 5 H); 5.40–5.27 (*m*, 1 H); 5.15 (*s*, 2 H); 4.69–4.43 (*m*, 1 H); 2.81 (*s*, 3 H); 1.98–1.58 (*m*, 2 H); 0.87 (*t*, $J = 10.6$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.5; 156.9; 156.0; 136.3; 128.3; 127.9; 127.5; 67.4; 64.0; 63.1; 53.8; 30.1; 29.3; 20.4; 20.1; 10.1.

Phenylmethyl [(1S)-1-(Diazoacetyl)butyl]methylcarbamate (**104**). Yield: 61%. Clear yellow oil. $[\alpha]_D^{20} = -194.7$ ($c = 1.3$, CH_2Cl_2). IR (NaCl): 2961, 2936, 2105, 1697, 1644, 1352, 1309, 1149, 783, 769, 742, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.12 (*s*, 5 H); 5.26–5.13 (*m*, 1 H); 4.94 (*s*, 2 H); 4.53–4.33 (*m*, 1 H); 2.59 (*s*, 3 H); 1.66–1.37 (*m*, 2 H); 1.07–1.02 (*m*, 2 H); 0.71 (*t*, $J = 10.6$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.3; 156.5; 155.4; 136.5; 128.0; 127.5; 127.1; 66.8; 62.4; 61.5; 53.6; 30.2; 29.5; 29.1; 28.6; 18.5; 13.1. HR-MS: 290.1510 ($[M+H]^+$, $C_{15}H_{20}N_3O_3^+$; calc. 290.1505).

Phenylmethyl [(1S)-3-Diazo-1-(1-methylethyl)-2-oxopropyl]methylcarbamate (**105**). Yield: 50%. Clear yellow oil. $[\alpha]_D^{20} = -306.7$ ($c = 1.2$, CH_2Cl_2). IR (NaCl): 3106, 3068, 3034, 2964, 2875, 2102, 1696, 1644, 1470, 1399, 1371, 1338, 1226, 1170, 978, 791, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.14 (*s*, 5 H); 5.31 (*s*, 1 H); 4.97 (*s*, 2 H); 4.12–3.92 (*m*, 1 H); 2.64 (*s*, 3 H); 2.15–2.03 (*m*, 1 H); 0.76 (*d*, $J = 6.5$, 3 H); 0.66 (*d*, $J = 5.2$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.0; 190.6; 156.4; 155.3; 136.2; 128.0; 127.7; 127.6; 127.5; 127.1; 66.9; 66.1; 54.6; 29.9; 29.4; 25.5; 25.1; 19.3; 19.1; 18.2; 18.1.

Phenylmethyl [(1S)-1-(Diazoacetyl)pentyl]methylcarbamate (**106**). Yield: 65%. Clear yellow oil. $[\alpha]_D^{18} = -182.9$ ($c = 1.1$, CH_2Cl_2). IR (NaCl): 2957, 2932, 2105, 1698, 1645, 1497, 1398, 1353, 1150, 1130, 770, 751, 735, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.11–7.02 (*m*, 5 H); 5.26–5.16 (*m*, 1 H); 4.95 (*s*, 2 H); 4.51–4.30 (*m*, 1 H); 2.59 (*s*, 3 H); 1.67–1.39 (*m*, 2 H); 1.10–1.00 (*m*, 4 H); 0.66 (*t*,

$J = 10.4$, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.3; 156.3; 155.1; 136.0; 127.9; 127.5; 127.1; 66.84; 62.1; 61.3; 53.2; 29.8; 29.0; 27.4; 26.6; 26.2; 21.8; 13.3. HR-MS: 304.1664 ($[M+H]^+$, $C_{16}H_{22}N_3O_3^+$; calc. 304.1661).

Phenylmethyl [(1S)-1-(Diazoacetyl)-3-methylbutyl]methylcarbamate (**107**). Yield: 54%. Clear yellow oil. $[\alpha]_D^{18} = -161.8$ ($c = 1.3$, CH_2Cl_2). IR (NaCl): 2957, 2871, 2106, 1669, 1646, 1468, 1347, 1310, 1163, 1131, 771, 753, 736, 698. ^{1}H-NMR (30 MHz, $CDCl_3$; rotamers): 7.21–7.12 (*m*, 5 H); 5.30–5.18 (*m*, 1 H); 5.03 (*s*, 2 H); 4.70–4.49 (*m*, 1 H); 2.67 (*s*, 3 H); 1.54–1.49 (*m*, 2 H); 1.38–1.34 (*m*, 1 H); 0.81–0.68 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.5; 156.8; 155.9; 136.1; 135.8; 128.0; 127.7; 127.6; 127.2; 67.0; 60.1; 60.0; 53.3; 35.9; 35.5; 30.2; 29.2; 24.2; 24.0; 22.7; 21.2; 20.9. HR-MS: 304.1664 ($[M+H]^+$, $C_{16}H_{22}N_3O_3^+$; calc. 304.1661).

Phenylmethyl [(1S,2S)-1-(Diazoacetyl)-2-methylbutyl]methylcarbamate (**108**). Yield: 50%. Clear yellow oil. $[\alpha]_D^{18} = -280.3$ ($c = 0.58$, CH_2Cl_2). IR (NaCl): 3066, 2964, 2932, 2104, 1697, 1646, 1454, 1346, 1304, 1139, 1115, 786, 767, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.28 (*s*, 5 H); 5.39 (*s*, 1 H); 5.08 (*s*, 2 H); 4.31–4.11 (*m*, 1 H); 2.76 (*s*, 3 H); 2.04 (*s*, 1 H); 1.34–0.95 (*m*, 2 H); 0.84–0.78 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.1; 190.6; 156.5; 155.5; 136.1; 136.0; 128.1; 128.0; 127.9; 127.8; 127.6; 127.2; 67.2; 67.1; 65.1; 64.6; 54.8; 30.9; 30.5; 29.5; 29.0; 24.2; 24.0; 15.2; 9.9.

Phenylmethyl [(1S)-3-Diazo-2-oxo-1-phenylpropyl]methylcarbamate (**109**). Yield: 71%. Clear yellow oil. IR (NaCl): 3090, 3065, 3032, 2950, 2106, 1696, 1650, 1496, 1453, 1353, 1146, 798, 754, 738, 700. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.26–7.12 (*m*, 10 H); 5.90 (br. *s*, 1 H); 5.18 (*s*, 1 H); 5.09 (*s*, 2 H); 2.69 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.3; 156.5; 141.3; 136.2; 129.3; 128.9; 128.7; 128.5; 128.4; 128.3; 128.1; 127.9; 127.7; 127.4; 67.6; 65.8; 54.6; 31.5. HR-MS: 324.1348 ($[M+H]^+$, $C_{18}H_{18}N_3O_3^+$; calc. 324.1348).

Phenylmethyl [(1S)-3-Diazo-2-oxo-1-(phenylmethyl)propyl]methylcarbamate (**110**). Yield: 51%. Clear, yellow oil. $[\alpha]_D^{18} = -128.8$ ($c = 0.9$, CH_2Cl_2). IR (NaCl): 3065, 3030, 2953, 2856, 2107, 1700, 1643, 1496, 1454, 1353, 1139, 769, 749, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.45–7.08 (*m*, 10 H); 5.39–5.27 (*m*, 1 H); 5.13–4.92 (*m*, 2 H); 4.75–4.53 (*m*, 1 H); 3.37–2.89 (*m*, 2 H); 2.81 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.7; 156.3; 155.4; 137.1; 136.8; 136.2; 135.8; 128.6; 128.2; 127.9; 127.8; 127.8; 127.7; 127.3; 126.9; 126.7; 126.5; 126.3; 67.3; 67.0; 64.3; 62.8; 57.7; 56.4; 33.3; 33.1; 31.1; 30.2. HR-MS: 338.1497 ($[M+H]^+$, $C_{19}H_{20}N_3O_3^+$; calc. 338.1505).

(2S)-4-Diazo-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-oxobutyl Acetate (**111**). Yield: 51%. Clear yellow oil. $[\alpha]_D^{18} = -142.2$ ($c = 1.2$, CH_2Cl_2). IR (NaCl): 3092, 3034, 2958, 2111, 1745, 1704, 1699, 1643, 1497, 1366, 1229, 1158, 1034, 786, 769, 739, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.17–7.10 (*m*, 5 H); 5.48–5.31 (*m*, 1 H); 5.10–4.92 (*m*, 2 H); 4.84–4.66 (*m*, 1 H); 4.40–4.18 (*m*, 2 H); 2.73 (*s*, 3 H); 1.73 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 189.9; 169.8; 156.2; 155.2; 136.0; 135.7; 128.0; 128.0; 127.8; 127.7; 127.3; 67.2; 67.1; 61.2; 60.6; 60.6; 59.7; 54.1; 31.4; 30.5; 19.9. HR-MS: 320.1235 ($[M+H]^+$, $C_{15}H_{18}N_3O_5^+$; calc. 320.1246).

(1R,2S)-4-Diazo-1-methyl-2-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-oxobutyl Acetate (**112**). Yield: 60%. Clear yellow oil. $[\alpha]_D^{18} = -142.4$ ($c = 1.1$, CH_2Cl_2). IR (NaCl): 2980, 2939, 2109, 1741, 1703, 1644, 1497, 1369, 1304, 1237, 1147, 1036, 770, 753, 739, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.25 (*s*, 5 H); 5.41–5.28 (*m*, 2 H); 5.16–5.00 (*m*, 2 H); 4.77–4.54 (*m*, 1 H); 2.79 (*s*, 3 H); 1.81–1.79 (*m*, 3 H); 1.17–1.11 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 189.4; 189.3; 169.3; 169.2; 156.7; 155.5; 136.0; 135.9; 128.1; 127.9; 127.7; 127.4; 67.4; 67.3; 66.5; 64.9; 64.2; 54.8; 31.4; 30.6; 20.4; 17.3; 17.1. HR-MS: 334.1390 ($[M+H]^+$, $C_{16}H_{20}N_3O_5^+$; calc. 334.1403).

Phenylmethyl [(1S)-1-(Diazoacetyl)-4-(1,3-dihydro-1,3-dioxo-2H-isoindol-2-yl)butyl]methylcarbamate (**113**). Yield: 53%. Clear yellow oil. $[\alpha]_D^{18} = -117.3$ ($c = 0.8$, CH_2Cl_2). IR (NaCl): 3093, 3033, 2945, 2872, 2107, 1771, 1712, 1644, 1454, 1439, 1397, 1350, 1152, 1031, 721, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.78–7.65 (*m*, 4 H); 7.30–7.24 (*m*, 5 H); 5.40–5.25 (*m*, 1 H); 5.10 (*s*, 2 H); 4.78–4.60 (*m*, 1 H); 3.70–3.58 (*m*, 2 H); 2.77 (*s*, 3 H); 1.85–1.59 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.1; 168.0; 156.8; 155.8; 136.2; 131.8; 133.7; 128.3; 128.0; 127.9; 127.6; 123.0; 67.5; 61.6; 60.9; 54.0; 37.1; 36.8; 30.3; 29.5; 24.7; 24.3; 24.1. HR-MS: 435.1658 ($[M+H]^+$, $C_{23}H_{23}N_4O_5^+$; calc. 435.1668).

Phenylmethyl [(1S)-1-(Diazoacetyl)-5-(1,3-dihydro-1,3-dioxo-2H-isoindol-2-yl)pentyl]methylcarbamate (**114**). Yield: 69%. Clear yellow oil. $[\alpha]_D^{18} = -108.0$ ($c = 1.1$, CH_2Cl_2). IR (NaCl): 3091, 3007, 2943, 2864, 2106, 1771, 1711, 1644, 1454, 1397, 1351, 1147, 769, 721, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers):

7.77–7.64 (*m*, 4 H); 7.29 (*s*, 5 H); 5.38–5.23 (*m*, 1 H); 5.08 (*s*, 2 H); 4.67–4.47 (*m*, 1 H); 3.60 (*t*, *J* = 7.0, 2 H); 2.76 (*s*, 3 H); 1.89–1.17 (*m*, 6 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.3; 168.1; 156.7; 155.8; 136.2; 131.9; 133.7; 128.3; 127.9; 127.6; 123.0; 67.4; 62.4; 61.4; 53.9; 37.4; 30.2; 29.5; 28.0; 26.7; 26.4; 20.8. HR-MS: 449.1831 ($[M+H]^+$, $C_{24}H_{25}N_4O_5^+$; calc. 449.1825).

*Phenylmethyl {(1*S*)-3-Diazo-1-[(1-formyl-1*H*-indol-3-yl)methyl]-2-oxopropyl}methylcarbamate* (**115**). Yield: 56%. Clear yellow oil. $[\alpha]_D^{18} = -122.8$ ($c = 0.5$, CH_2Cl_2). IR (NaCl): 3012, 2926, 2856, 2107, 1702, 1643, 1607, 1496, 1355, 1202, 1140, 792, 748, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 9.31–8.34 (*m*, 2 H); 7.58–6.87 (*m*, 9 H); 5.43–5.31 (*m*, 1 H); 5.17–4.87 (*m*, 3 H); 3.39–2.93 (*m*, 2 H); 2.84 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.2; 158.9; 156.4; 155.2; 136.0; 135.5; 134.0; 130.8; 128.2; 128.1; 127.5; 125.1; 124.2; 123.7; 122.4; 119.4; 118.7; 118.5; 115.8; 109.3; 67.5; 67.4; 61.9; 60.6; 54.1; 30.7; 29.8; 22.9; 22.5. HR-MS: 376.1421 ($[M-28]^+$, $C_{22}H_{20}N_2O_4^+$; calc. 376.1423).

*Phenylmethyl (3*S*)-5-Diazo-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-oxopentanoate* (**127**). Yield: 50%. Clear yellow oil. $[\alpha]_D^{18} = -136.5$ ($c = 0.45$, CH_2Cl_2). IR (NaCl): 3091, 3009, 2953, 2109, 1734, 1702, 1644, 1454, 1366, 1306, 1146, 955, 768, 751, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 10 H); 5.42–5.24 (*m*, 1 H); 5.14–5.07 (*m*, 4 H); 4.92–4.83 (*m*, 1 H); 3.23–2.58 (*m*, 2 H); 2.92–2.82 (*m*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 190.6; 170.0; 155.9; 155.0; 135.8; 135.7; 135.2; 128.2; 127.9; 127.6; 67.6; 67.5; 66.5; 66.3; 60.3; 58.7; 53.8; 33.0; 32.3; 31.9; 30.5.

*Phenylmethyl (4*S*)-6-Diazo-4-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-oxohexanoate* (**128**). Yield: 70%. Clear yellow oil. $[\alpha]_D^{20} = -133.3$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 3040, 2950, 2108, 1737, 1732, 1703, 1697, 1644, 1497, 1351, 1317, 1138, 752, 739, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.32 (*s*, 10 H); 5.43–5.28 (*m*, 1 H); 5.20–5.03 (*m*, 4 H); 4.91–4.57 (*m*, 1 H); 2.83–2.79 (*m*, 3 H); 2.39–1.90 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 191.5; 188.0; 172.0; 136.4; 135.4; 128.2; 127.9; 127.5; 67.5; 66.1; 60.6; 53.7; 30.2; 29.5; 22.4; 22.1.

*Phenylmethyl ((1*S*)-1-{2-[Bis(phenylmethyl)amino]-2-oxoethyl}-3-diazo-2-oxopropyl)methylcarbamate* (**135**). Yield: 48%. Clear yellow oil. $[\alpha]_D^{20} = -133.2$ ($c = 0.8$, CH_2Cl_2). IR (NaCl): 3088, 3064, 2955, 2926, 2107, 1704, 1698, 1650, 1644, 1495, 1469, 1398, 1149, 734, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.35–7.02 (*m*, 15 H); 5.48–5.22 (*m*, 1 H); 5.13–5.07 (*m*, 2 H); 4.65–4.32 (*m*, 5 H); 2.89–2.85 (*m*, 3 H); 2.66–2.16 (*m*, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 190.0; 170.8; 155.7; 155.0; 136.7; 136.1; 135.9; 129.5; 129.2; 128.9; 128.3; 128.2; 127.9; 127.8; 127.6; 127.5; 127.1; 126.3; 126.1; 125.8; 125.4; 67.2; 60.2; 59.9; 53.8; 53.4; 49.5; 48.0; 47.7; 33.1; 32.0; 31.8; 31.5; 31.4. HR-MS: 485.2189 ($[M+H]^+$, $C_{28}H_{29}N_4O_4^+$; calc. 485.2189).

*Phenylmethyl {(1*S*)-4-[Bis(phenylmethyl)amino]-1-(diazoacetyl)-4-oxobutyl}methylcarbamate* (**136**). Yield: 65%. Clear yellow oil. $[\alpha]_D^{20} = -69.1$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 3088, 3063, 2948, 2106, 1738, 1700, 1646, 1495, 1467, 1348, 1192, 1080, 768, 734, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.29–7.05 (*m*, 15 H); 5.42–5.25 (*m*, 1 H); 5.10 (*s*, 2 H); 4.86–4.32 (*m*, 5 H); 2.81–2.77 (*m*, 3 H); 2.44–1.98 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.0; 171.8; 156.6; 136.9; 136.1; 135.9; 128.6; 128.3; 128.2; 128.1; 128.0; 127.8; 127.7; 127.5; 127.4; 127.3; 126.0; 67.3; 67.0; 61.6; 61.1; 53.8; 53.5; 49.5; 48.0; 30.7; 29.8; 29.0; 28.7; 23.1; 22.7. HR-MS: 499.2334 ($[M+H]^+$, $C_{29}H_{31}N_4O_4^+$; calc. 499.2345).

*Phenylmethyl ((1*R*)-3-Diazo-2-oxo-1-{[(phenylmethyl)sulfanyl]methyl}propyl)methylcarbamate* (**145**). Yield: 50%. Clear yellow oil. $[\alpha]_D^{22} = 182.2$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 3064, 3031, 2930, 2108, 1697, 1643, 1494, 1479, 1355, 1133, 1071, 766, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.35–7.21 (*m*, 10 H); 5.39–5. 16 (*m*, 3 H); 4.87–4.53 (*m*, 1 H); 3.70–3.59 (*m*, 2 H); 2.96–2.60 (*m*, 2 H); 2.77 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 191.0; 156.7; 137.6; 136.3; 128.7; 128.3; 127.9; 127.5; 126.9; 67.5; 62.0; 60.7; 54.0; 35.9; 29.5; 28.9. HR-MS: 384.1381 ($[M+H]^+$, $C_{20}H_{22}N_3O_3S^+$; calc. 384.1382).

*Phenylmethyl {(1*S*)-3-Diazo-1-[2-(methylsulfanyl)ethyl]-2-oxopropyl}methylcarbamate* (**146**). Yield: 52%. Clear yellow oil. $[\alpha]_D^{22} = -168.2$ ($c = 1.6$, CH_2Cl_2). IR (NaCl): 3092, 3033, 2918, 2107, 1697, 1644, 1398, 1342, 1132, 697. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.27 (*s*, 5 H); 5.37–5.23 (*m*, 1 H); 5.09 (*s*, 2 H); 4.78–4.63 (*m*, 1 H); 2.76 (*s*, 2 H); 2.39–1.76 (*m*, 7 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 192.0; 191.8; 156.2; 155.1; 136.0; 135.8; 128.2; 127.8; 127.4; 67.3; 61.3; 60.7; 53.8; 30.8; 29.8; 30.1; 26.5; 15.1; 15.0. HR-MS: 322.1225 ($[M+H]^+$, $C_{15}H_{20}N_3O_3S^+$; calc. 322.1226).

*Phenylmethyl ((1*S*)-3-Diazo-1-{[4-(methyloxy)phenyl]methyl}-2-oxopropyl)methylcarbamate* (**153**). Yield: 65%. Clear yellow oil. $[\alpha]_D^{20} = -137.8$ ($c = 1.0$, CH_2Cl_2). IR (NaCl): 3090, 2996, 2935, 2105, 1699, 1639, 1513, 1454, 1398, 1354, 1304, 1137, 823, 795, 766, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers):

7.38–6.72 (*m*, 9 H); 5.38–5.27 (*m*, 1 H); 5.14–4.70 (*m*, 3 H); 3.74 (*s*, 3 H); 3.27–2.84 (*m*, 2 H); 2.80 (*s*, 3 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 190.9; 157.9; 156.3; 155.4; 136.1; 135.7; 129.5; 128.8; 128.6; 128.1; 127.9; 127.7; 127.6; 127.2; 113.5; 67.3; 67.0; 64.4; 62.8; 54.8; 53.9; 32.5; 32.3; 31.0; 30.1. HR-MS: 368.1621 ($[M+H]^+$, $C_{20}H_{22}N_3O_4^+$; calc. 368.1610).

General Procedure for the Preparation of the N-*Methyl β-Amino Acids* **49**–**60**, **116**–**118**, **129**, **130**, **137**, **138**, **147**, **148**, **154**, *and* **171**. To a soln. of the diazoketone (1 mmol) in 1,4-dioxane/H_2O 9:1 (*v*/*v*; 50 ml) was added CF_3COOAg (0.1 mmol). The mixture was sonicated in an ultrasound bath for 30 min, or until the diazoketone had disappeared according to TLC (AcOEt/hexane). Then, sat. aq. $NaHCO_3$ soln. was added. The resulting precipitate was filtered off through a bed of *Celite*, the filter cake being washed with sat. aq. $NaHCO_3$ soln. and Et_2O. The filtrate was placed in a separating funnel, and the aq. layer was washed with Et_2O (2×). The org. layer was extracted with sat. aq. $NaHCO_3$ soln, and the combined aq. layers were acidified to pH 2 with dilute aq. HCl, and finally extracted with AcOEt (3×). The org. extract was dried ($MgSO_4$) and evaporated *in vacuo*, and the residue was subjected to CC for analysis. For ease of handling, the corresponding *tert*-butylammonium salt may be prepared in the usual manner. The free acid was taken up in the minimum amount of anh. Et_2O and treated with *t*-$BuNH_2$ (1.05 mmol). A precipitate slowly formed. Dropwise addition of hexane sometimes aided the precipitation process. Stirring was generally continued for 16 h. The solid was suction-filtered, and the filter cake was washed with cold Et_2O/hexane to afford the salt as a colourless solid.

3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)propanoic Acid (**49**). Yield: 70%. Clear colourless oil. The anal. data of the dicyclohexylammonium salt were identical to those reported above.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**50**). Yield: 72%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**51**). Yield: 53%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**52**). Yield: 60%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-4-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**53**). Yield: 86%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)heptanoic Acid* (**54**). Yield: 81%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-5-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**55**). Yield: 72%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*R*,4*S*)-4-Methyl-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoic Acid* (**56**). Yield: 58%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-3-phenylpropanoic Acid (**57**). Yield: 80%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-phenylbutanoic Acid* (**58**). Yield: 45%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*R*)-4-(Acetyloxy)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**59**). Yield: 92%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*R*,4*R*)-4-(Acetyloxy)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)pentanoic Acid* (**60**). Yield: 90%. The anal. data of the *tert*-butylammonium salt were identical to those reported above.

*(3*S*)-6-(1,3-Dihydro-1,3-dioxo-2*H*-isoindol-2-yl)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-hexanoic Acid* (**116**). Yield: 72%. Colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 111–116°. $[\alpha]_D^{21} = 0$ ($c = 1.7$, MeOH). IR (KBr): 2985, 2909, 2628, 2557, 2235, 1773, 1716, 1684, 1545, 1435, 1393, 1329, 1204, 1155, 1020, 838, 770, 721. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.80–7.66 (*m*, 4 H); 7.75 (*s*, 3 H); 7.27 (*s*, 5 H); 5.06–5.00 (*m*, 2 H); 4.46 (br. *s*, 2 H); 3.63 (br. *s*, 2 H); 2.75 (*s*, 3 H); 2.40–2.22 (*m*, 2 H); 1.55–1.28 (*m*, 4 H); 1.28 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 177.2; 168.2; 156.6; 136.9; 132.2; 133.8; 128.4; 127.8; 127.6; 123.1; 67.0; 54.0; 51.5; 42.2; 41.6; 37.8; 29.6; 29.2; 28.8; 27.6; 25.6. Anal. calc. for $C_{27}H_{35}N_3O_6$ (497.25) C 65.17, H 7.09, N 8.44; found: C 65.08, H 6.96, N 8.39.

*(3*S*)-7-(1,3-Dihydro-1,3-dioxo-2*H*-isoindol-2-yl)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-heptanoic Acid* (**117**). Yield: 56%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 83–86°. $[\alpha]_D^{21} = +2.6$ ($c = 3.5$, MeOH). IR (KBr): 2975, 2929, 2626, 2543, 2236, 1774, 1706, 1658, 1546,

1397, 1334, 1205, 1132, 1058, 755, 720. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.73 (*s*, 3 H); 7.78–7.62 (*m*, 4 H); 7.27 (*s*, 5 H); 5.11–4.98 (*m*, 2 H); 4.44–4.40 (*m*, 1 H); 3.64–3.59 (*m*, 2 H); 2.74 (*s*, 3 H); 2.33–2.21 (*m*, 2 H); 1.51–1.23 (*m*, 6 H); 1.25 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 177.1; 168.2; 156.6; 137.0; 132.2; 133.7; 128.4; 127.7; 127.5; 123.0; 66.9; 54.1; 51.0; 42.1; 41.6; 37.8; 31.8; 28.7; 28.3; 27.8; 23.6. HR-MS: 437.1709 ($[M-H]^-$, $C_{24}H_{25}N_2O_6^-$; calc. 437.1713).

*(3*S*)-4-(1-Formyl-1*H*-indol-3-yl)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**118**). Yield: 68%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 110–114°. $[\alpha]_D^{21} = -25.4$ (*c* = 1.8, MeOH). IR (KBr): 3094, 2932, 2622, 2551, 2359, 2250, 1707, 1545, 1452, 1383, 1209, 1131, 762, 756, 733, 695. ^{1}H-NMR (300 MHz, D_2O, 318 K; rotamers): 8.82–8.02 (*m*, 2 H); 7.44–6.86 (*m*, 9 H); 4.91–4.66 (*m*, 3 H); 2.84–2.69 (*m*, 5 H); 2.58–2.53 (*m*, 2 H); 1.37 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$; 318K): 178.6; 157.4; 161.2; 156.7; 136.4; 135.9; 133.5; 131.1; 128.2; 127.3; 126.7; 124.6; 124.2; 123.6; 121.8; 121.2; 120.3; 119.0; 115.3; 109.9; 67.0; 66.4; 54.1; 53.9; 51.8; 40.6; 28.6; 28.3; 27.1; 26.6; 26.5. Anal. calc. for $C_{26}H_{33}N_3O_5$ (467.56): C 66.79, H 7.11, N 8.99; found: C 66.70, H 7.05, N 8.89.

*(3*R*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-oxo-5-[(phenylmethyl)oxy]pentanoic Acid* (**129**). Yield: 68%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 101–105°. $[\alpha]_D^{20} = +0.7$ (*c* = 1.0, MeOH). IR (KBr): 3412, 2974, 2840, 2636, 2557, 2221, 1724, 1699, 1641, 1546, 1399, 1306, 1239, 1158, 1129, 768, 736, 697. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.28–7.27 (*m*, 10 H); 6.55 (*s*, 3 H); 5.04–4.96 (*m*, 4 H); 4.72 (br. *s*, 1 H); 2.82 (*s*, 3 H); 2.64–2.44 (*m*, 4 H); 1.21 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 175.7; 170.5; 155.7; 155.0; 136.5; 135.5; 128.1; 128.0; 127.8; 127.7; 127.4; 127.2; 126.7; 66.6; 66.0; 52.3; 50.6; 39.7; 37.0; 30.7; 29.2; 27.6. Anal. calc. for $C_{25}H_{34}N_2O_6$ (458.54) C 65.48, H 7.47, N 6.11; found: C 65.32, H 7.51, N 6.11.

*(3*S*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-6-oxo-6-[(phenylmethyl)oxy]hexanoic Acid* (**130**). Yield: 69%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 86–90°. $[\alpha]_D^{20} = +10.8$ (*c* = 3.2, MeOH). IR (KBr): 2944, 2838, 2628, 2549, 2360, 2343, 2238, 1738, 1688, 1538, 1408, 1356, 1224, 1117, 737, 728, 694, 668. ^{1}H-NMR (300 MHz, D_2O; 323 K; rotamers): 7.25 (*s*, 10 H); 5.06–4.98 (*m*, 4 H); 4.52–4.50 (*m*, 1 H); 2.81–2.69 (*m*, 3 H); 2.48 (*m*, 2 H); 2.24 (*m*, 2 H); 1.87 (*m*, 2 H); 1.48 (*s*, 9 H). ^{13}C-NMR (75 MHz, D_2O, 323 K; rotamers): 178.7; 174.4; 157.6; 157.2; 136.5; 135.6; 128.3; 127.9; 127.8; 127.7; 127.3; 67.2; 66.9; 66.2; 53.9; 51.9; 41.0; 30.7; 28.1; 27.9; 26.7; 26.5. Anal. calc. for $C_{26}H_{36}N_2O_6$ (472.57): C 66.08, H 7.68, N 5.93; found: C 66.25, H 7.63, N 6.00.

*(3*S*)-5-[Bis(phenylmethyl)amino]-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-oxopentanoic Acid* (**137**). Yield: 74%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 102–105°. $[\alpha]_D^{18} = -15.1$ (*c* = 3.3, MeOH). IR (KBr): 2973, 2837, 2627, 2541, 2197, 1699, 1636, 1548, 1452, 1385, 1328, 1159, 1122, 964, 751, 707, 697. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.47 (*s*, 3 H); 7.27–7.08 (*m*, 15 H); 5.02 (*s*, 2 H); 4.63–4.35 (*m*, 5 H); 3.11–2.48 (*m*, 4 H); 2.94 (br. *s*, 3 H); 1.19 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.7; 171.6; 155.8; 137.4; 137.0; 136.7; 129.3; 128.8; 128.5; 128.4; 128.2; 127.7; 127.5; 127.3; 127.0; 126.7; 67.0; 66.7; 54.9; 53.3; 50.5; 50.2; 48.2; 41.5; 40.7; 37.4; 36.9; 36.1; 33.7; 33.0; 28.2. Anal. calc. for $C_{32}H_{41}N_3O_5$ (547.69): C 70.18, H 7.55, N 7.67; found: C 70.15, H 7.60, N 7.61.

*(3*S*)-6-[Bis(phenylmethyl)amino]-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)-6-oxohexanoic Acid* (**138**). Yield: 85%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 108–111°. $[\alpha]_D^{18} = +6.7$ (*c* = 3.2, MeOH). IR (KBr): 2972, 2634, 2547, 2234, 1698, 1640, 1547, 1400, 1335, 1209, 1152, 736, 696. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.70 (*s*, 3 H); 7.28–6.98 (*m*, 15 H); 5.12–4.87 (*m*, 2 H); 4.62–4.18 (*m*, 5 H); 2.69 (*s*, 3 H); 2.42–2.27 (*m*, 4 H); 1.90 (*m*, 2 H); 1.24 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K; rotamers): 176.7; 172.9; 156.6; 137.4; 137.0; 136.5; 128.9; 128.5; 128.4; 128.2; 127.8; 127.5; 127.3; 126.5; 66.9; 53.9; 50.9; 50.1; 48.4; 41.6; 29.9; 28.6; 28.0; 27.7. Anal. calc. for $C_{33}H_{43}N_3O_5$ (561.71): C 70.56, H 7.72, N 7.48; found: C 70.47, H 7.74, N 7.47.

*(3*R*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-4-[(phenylmethyl)sulfanyl]butanoic Acid* (**147**). Yield: 87%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 89–90°. $[\alpha]_D^{23} = -39.0$ (*c* = 1.6, MeOH). IR (KBr): 2976, 2919, 2629, 2529, 1697, 1682, 1557, 1455, 1398, 1329, 1273, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.31–7.18 (*m*, 10 H); 6.54 (br. *s*, 3 H); 5.25–5.00 (*m*, 2 H); 4.65–4.57 (*m*, 1 H); 3.70–3.65 (*m*, 2 H); 2.78–2.75 (*m*, 3 H); 2.67–2.40 (*m*, 4 H); 1.25 (*s*, 9

H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 176.9; 176.8; 156.5; 138.2; 138.1; 136.8; 136.7; 128.9; 128.4; 127.8; 127.8; 127.4; 126.8; 67.1; 66.8; 53.7; 50.7; 41.2; 40.8; 36.1; 36.0; 34.1; 33.9; 29.5; 27.8. HR-MS: 374.1442 ($[M+H]^+$, $C_{20}H_{24}NO_4S^+$; calc. 374.1426).

*(3*R*)-3-(Methyl{[(phenylmethyl)oxy]carbonyl}amino)-5-(methylsulfanyl)pentanoic Acid* (**148**). Yield: 44%. Clear colourless oil. $[\alpha]_D^{23} = -1.74$ ($c = 1.0$, CH_2Cl_2). IR (KBr): 3032, 2918, 1732, 1701, 1454, 1404, 1341, 1212, 1145, 768, 698. ^{1}H-NMR (300 MHz, $CDCl_3$, 323 K; rotamers): 10.00 (br. *s*, 1 H); 7.31 (*s*, 5 H); 5.14 (*s*, 2 H); 4.82–4.47 (*m*, 1 H); 2.91–2.82 (*m*, 3 H); 2.63–1.75 (*m*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 323 K; rotamers): 175.5; 156.4; 136.6; 128.4; 127.9; 127.8; 127.7; 67.6; 67.2; 58.2; 57.8; 53.5; 52.6; 37.4; 31.8; 30.6; 28.4; 15.4; 15.2. HR-MS: 312.1270 ($[M+H]^+$; $C_{15}H_{22}NO_4S^+$; calc. 312.1270).

*(3*S*)-4-[4-(Methyloxy)phenyl]-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)butanoic Acid* (**154**). Yield: 87%. Clear colourless oil. Anal. data of *tert*-butylammonium salt: M.p. 103–108°. $[\alpha]_D^{18} = -27.5$ ($c = 3.4$, MeOH). IR (KBr): 2982, 2931, 2835, 2632, 2548, 2242, 1690, 1640, 1611, 1549, 1513, 1406, 1344, 1247, 1200, 1120, 1032, 821, 763, 742. ^{1}H-NMR (300 MHz, $CDCl_3$, 318 K; rotamers): 7.83 (*s*, 3 H); 7.26–7.17 (*m*, 5 H); 7.05–6.72 (*m*, 4 H); 5.06–4.93 (*m*, 2 H); 4.57 (br. *s*, 1 H); 3.72 (*s*, 3 H); 2.76 (*s*, 3 H); 2.69 (*s*, 2 H); 2.48–2.39 (*m*, 2 H); 1.23 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$; 318 K; rotamers): 177.1; 158.2; 156.4; 156.1; 137.2; 137.0; 130.9; 130.0; 129.7; 128.8; 128.3; 127.7; 127.4; 113.8; 66.9; 66.5; 57.0; 56.1; 55.2; 50.6; 41.6; 40.9; 38.0; 37.6; 30.7; 30.0; 28.0. Anal. calc. for $C_{24}H_{34}N_2O_5$ (430.25): C 66.95, H 7.96, N 6.51; found: C 66.95, H 8.01, N 6.46.

(1-Methylpyrrolidin-2-yl)acetic Acid (**164**) [41]. Yield: 95%. Clear orange oil. Anal. data of hydrochloride salt: M.p. 149–161°. $[\alpha]_D^{19} = -10.0$ ($c = 1.8$, MeOH). IR (KBr): 3105, 2961, 2728, 1710, 1550, 1464, 1402, 1192, 835, 611. ^{1}H-NMR (300 MHz, D_2O; rotamers): 3.63–3.57 (*m*, 2 H); 3.09–3.02 (*m*, 1 H); 2.91–2.61 (*m*, 5 H); 2.30–2.25 (*m*, 1 H); 2.02–1.90 (*m*, 2 H); 1.73–1.71 (*m*, 1 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 318 K): 173.2; 64.9; 56.1; 39.6; 34.2; 28.8; 21.0. HR-MS: 144.1029 ($[M+H]^+$, $C_7H_{14}NO_2^+$; calc. 144.1025).

*Phenylmethyl (4*S*)-5-Oxo-4-{2-oxo-2-[(phenylmethyl)oxy]ethyl}-1,3-oxazolidine-3-carboxylate* (**123**). The anal. data were identical to those previously described [16].

*Phenylmethyl (4*S*)-5-Oxo-4-{3-oxo-3-[(phenylmethyl)oxy]propyl}-1,3-oxazolidine-3-carboxylate* (**124**). To a soln. of **122** (2.0 mmol) in CH_2Cl_2 (10 ml) were added Et_3N (2.0 mmol), benzyl chloroformate (2.0 mmol), and 4-(dimethylamino)pyridine (DMAP; 0.2 mmol) successively at 0°, and the mixture was stirred at this temp. for 90 min. Then, the mixture was diluted with CH_2Cl_2, and the soln. was washed sequentially with sat. aq. $NaHCO_3$ soln., 10% aq. citric acid soln., and H_2O. The org. layer was dried ($MgSO_4$) and concentrated under reduced pressure. The residue was purified by CC (35% AcOEt/hexane) to afford the title compound. Yield: 70%. Oil. $[\alpha]_D^{24} = +55.6$ ($c = 1.3$, CH_2Cl_2). IR (NaCl): 3033, 2956, 2931, 1801, 1730, 1416, 1358, 1257, 1129, 1053, 751, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.33 (*s*, 10 H); 5.48–5.46 (*m*, 1 H); 5.15 (br. *s*, 3 H); 5.08 (*s*, 2 H); 4.36–4.23 (*m*, 1 H); 2.50–2.19 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.7; 171.5; 152.9; 135.7; 135.3; 128.6; 128.4; 128.2; 77.7; 68.0; 66.4; 54.0; 29.4; 25.9. HR-MS: 384.1463 ($[M+H]^+$, $C_{21}H_{22}NO_6^+$; calc. 384.1447).

General Procedure for the Preparation of the Oxazolidinones **131** *and* **132**. The appropriate 1,3-oxazolidin-5-one (8.0 mmol) in $SOCl_2$ (6 ml) was heated at reflux for 15 min under an inert atmosphere. The excess $SOCl_2$ was removed at reduced pressure, the residue was dissolved in toluene, and the mixture was evaporated *in vacuo* (3×). The acid chloride was then dissolved in anh. CH_2Cl_2, cooled to 0°, and slowly treated with anh. dibenzylamine (16.0 mmol). The mixture was stirred for 30 min while coming to r.t. The resulting hydrochloride salt was filtered off, and the org. layer was washed successively with dilute aq. HCl (2×), sat. aq. Na_2CO_3 soln., and H_2O. The org. layer was dried ($MgSO_4$) and concentrated *in vacuo*. The resultant oil derived from asparagine could be crystallised from AcOEt/hexane to yield the dibenzylamide **131**. The glutamine derivative **132** was purified by CC (30% AcOEt/hexane).

*Data of Phenylmethyl (4*S*)-4-{2-[Bis(phenylmethyl)amino]-2-oxoethyl}-5-oxo-1,3-oxazolidine-3-carboxylate* (**131**). Yield: 45%. Off-white solid. M.p. 80–85°. $[\alpha]_D^{20} = +115.5$ ($c = 1.6$, CH_2Cl_2). IR (KBr): 3087, 3063, 2925, 1799, 1714, 1645, 1451, 1420, 1359, 1213, 1131, 732, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.36–7.12 (*m*, 15 H); 5.60–5.48 (*m*, 2 H); 5.18–5.02 (*m*, 2 H); 4.64–4.14 (*m*, 5 H);

3.60–3.04 (*m*, 2 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 172.1; 169.2; 152.3; 136.3; 135.3; 128.7; 128.4; 128.2; 127.9; 127.3; 126.2; 125.8; 78.4; 78.0; 67.3; 51.7; 49.5; 48.9; 47.8; 34.0; 33.2. HR-MS: 458.1846 (M^+, $C_{27}H_{26}N_2O_5^+$; calc. 458.1842).

*Data of Phenylmethyl (4*S*)-4-{3-[Bis(phenylmethyl)amino]-3-oxopropyl}-5-oxo-1,3-oxazolidine-3-carboxylate* (**132**). Yield: 52%. Clear colourless oil. $[\alpha]_D^{20} = +71.5$ ($c = 1.1$, CH_2Cl_2). IR (KBr): 3063, 3031, 2921, 1799, 1715, 1650, 1645, 1416, 1359, 1212, 1028, 733, 699. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.37–7.09 (*m*, 15 H); 5.50 (*s*, 1 H); 5.18–5.10 (*m*, 3 H); 4.67–4.36 (*m*, 5 H); 2.64–2.24 (*m*, 4 H). ^{13}C-NMR (75 MHz, $CDCl_3$; rotamers): 171.7; 171.4; 152.8; 136.8; 135.9; 135.1; 128.7; 128.4; 128.3; 128.0; 127.9; 127.3; 127.1; 126.1; 77.2; 67.6; 53.7; 49.5; 48.0; 27.9; 25.9. HR-MS: 472.1996 (M^+, $C_{28}H_{28}N_2O_5^+$; calc. 472.1998).

*Synthesis of 1,1-Dimethylethyl (3*S*)-6-(1,3-Dihydro-1,3-dioxo-2*H*-isoindol-2-yl)-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoate* (**165**). *Method 1* (*via Wolff* rearrangement of **113**). To a soln. of the diazoketone **113** (0.1 mmol) in 1,4-dioxane/*t*-BuOH 9:1 (*v*/*v*, 5 ml), CF_3COOAg (0.01 mmol) was added, and the mixture was sonicated in an ultrasound bath for 30 min, or until no diazoketone was detected by TLC. The mixture was concentrated *in vacuo*. The residue was dissolved in AcOEt, and the org. soln. was washed successively with 10% aq. citric acid soln., sat. aq. Na_2CO_3 soln., and H_2O. The org. layer was dried ($MgSO_4$) and evaporated *in vacuo*. The residue was subjected to CC (40% AcOEt/hexane) to afford **165** in 45% yield. Clear colourless oil. $[\alpha]_D^{19} = -11.38$ ($c = 2.2$, CH_2Cl_2). IR (NaCl): 2976, 2937, 1772, 1713, 1397, 1367, 1305, 1213, 1087, 721, 698. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 7.73–7.61 (*m*, 4 H); 7.24–7.09 (*m*, 5 H); 5.14–4.96 (*m*, 2 H); 4.49–4.43 (*m*, 1 H); 3.60–3.53 (*m*, 2 H); 2.78–2.70 (*m*, 3 H); 2.35–2.10 (*m*, 2 H); 1.55–1.02 (*m*, 6 H); 1.28 (*s*, 9 H). ^{13}C-NMR (75 MHz, $CDCl_3$): 169.8; 169.7; 167.9; 155.9; 136.6; 136.4; 133.6; 131.8; 128.1; 127.7; 127.5; 127.5; 122.8; 80.4; 80.3; 66.9; 66.6; 52.9; 52.6; 39.5; 39.1; 37.3; 37.1; 29.4; 29.1; 28.5; 27.6; 25.1; 25.0. HR-MS: 481.2340 (M^+, $C_{27}H_{33}N_2O_6^+$; calc. 481.2339).

Method 2 (*via* Esterification of **116**). The carboxylic acid **116** (1.0 mmol) was dissolved in a minimum of anh. *t*-BuOH. Then, DMAP (0.1 mmol) and di(*tert*-butyl) dicarbonate (Boc_2O; 2.0 mmol) were added at r.t., and the soln. was stirred for 20 h. The mixture was concentrated under reduced pressure, and the residue was subjected to CC (80% AcOEt/hexane). The resultant oil was further purified by CC (45% AcOEt/hexane) to furnish pure **165** in 43% yield. For anal. data, see above (*Method 1*).

*Synthesis of 1,1-Dimethylethyl (3*S*)-6-Amino-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoate* (**166**) *and 1,1-Dimethylethyl (3*S*)-6-{[(*Z*)-({[(1,1-Dimethylethyl)oxy]carbonyl}amino)({[(1,1-dimethylethyl)oxy]carbonyl}imino)methyl]amino}-3-(methyl{[(phenylmethyl)oxy]carbonyl}amino)hexanoate* (**168**). A soln. of **165** (0.4 mmol) in anh. *t*-BuOH (5 ml) and ethylenediamine (1 ml) was stirred at 90° for 16 h. The soln. was concentrated *in vacuo*, and then the residue was dissolved in toluene and further concentrated. This process was repeated three times. The residue was taken up in AcOEt, and the soln. was washed with sat. aq. $NaHCO_3$ soln. (2×). The org. layer was dried ($MgSO_4$) and evaporated under reduced pressure to afford **166**. The latter was dissolved in $CHCl_3$ (3 ml), treated with 'di-boc-triflylguanidine' (**167**; 0.4 mmol) and then *Hünig* base (i-Pr_2NEt; 0.6 mmol). The mixture was stirred at r.t. for 2 h, and concentrated under reduced pressure. The residue was subjected to CC ($CHCl_3$). The resultant oil was further purified by CC (20% AcOEt/hexane) to afford **168** in 62% yield.

Data of **168**. Colourless oil. $[\alpha]_D^{19} = -0.06$ ($c = 0.6$, CH_2Cl_2). IR (NaCl): 3334, 2978, 2934, 1723, 1640, 1616, 1415, 1367, 1333, 1156, 1134, 767. ^{1}H-NMR (300 MHz, $CDCl_3$; rotamers): 11.43 (*s*, 1 H); 8.21 (*s*, 1 H); 7.32–7.27 (*m*, 5 H); 5.08 (*s*, 2 H); 4.48–4.42 (*m*, 1 H); 3.36 (*s*, 2 H); 2.77 (*s*, 3 H); 2.48–2.18 (*m*, 2 H); 1.47–1.24 (*m*, 31 H). ^{13}C-NMR (75 MHz, $CDCl_3$, 325 K): 170.0; 163.6; 156.3; 156.1; 153.3; 136.8; 128.4; 128.0; 127.8; 83.0; 80.7; 79.1; 67.2; 53.3; 40.5; 39.8; 29.6; 28.9; 28.3; 28.1; 27.9; 25.9. Anal. calc. for $C_{30}H_{48}N_4O_8$ (592.72): C 60.79, H 8.16, N 9.45; found: C 60.84, H 8.23, N 9.52.

*Phenylmethyl [(1*S*)-3-Diazo-1-{[1-(2,4-dinitrophenyl)-1*H*-imidazol-4-yl]methyl}-2-oxopropyl]methylcarbamate* (**170**). To a soln. of **169** (1 mmol) in anh. THF (5 ml) was added at −30° ethyl chloroformate (1.05 mmol) and collidine (1.05 mmol) successively. The mixture was stirred for 15 min. Then, an anh. soln. of CH_2N_2 (5 mmol; CAUTION!) [24] in CH_2Cl_2 was added slowly. The yellow soln. was allowed to warm to r.t., and stirring was continued until there was no acid remaining, as indicated by TLC. Excess CH_2N_2 was destroyed by addition of AcOH. The mixture was concentrated under reduced pressure, and the residue was dissolved in AcOEt. The org. phase was washed with sat. aq. $NaHCO_3$ soln.

The org. layer was dried ($MgSO_4$) and evaporated *in vacuo*, and the residue was subjected to CC (1. AcOEt, 2. AcOEt/MeOH 95:5) to afford the title compound in 50% yield. Clear orange gum. $[\alpha]_D^{19} = -12.70$ ($c = 0.38$, MeOH). IR (NaCl): 3100, 2943, 2108, 1694, 1641, 1609, 1537, 1348, 1141, 1081, 742. ^{1}H-NMR (300 MHz, DMSO; rotamers): 8.79–8.78 (*m*, 1 H); 8.51–8.49 (*m*, 1 H); 7.62–7.52 (*m*, 2 H); 7.30–7.23 (*m*, 6 H); 5.44–5.29 (*m*, 1 H); 5.15–4.86 (*m*, 3 H); 3.31–2.85 (*m*, 5 H). ^{13}C-NMR (75 MHz, DMSO): 191.8; 156.7; 146.7; 144.2; 140.5; 134.9; 136.4; 136.3; 129.1; 128.2; 128.0; 127.8; 121.2; 117.0; 67.6; 63.0; 61.7; 54.3; 31.8; 30.7; 26.6; 26.1. HR-MS: 494.1436 ($[M+H]^+$, $C_{22}H_{20}N_7O_7^+$; calc. 494.1424).

*Methyl (3*S*)-4-[1-(2,4-Dinitrophenyl)-1*H*-imidazol-4-yl]-3-(methyl{[(phenylmethyl)oxy]carbonyl}-amino)butanoate* (**172**). To a soln. of **170** (0.1 mmol) in 1,4-dioxane/MeOH 9:1 (*v*/*v*, 5 ml) was added CF_3CO_2Ag (0.01 mmol), and the mixture was sonicated in an ultrasound bath for 30 min, or until no diazoketone was detected by TLC. The mixture was concentrated *in vacuo*, the residue was dissolved in AcOEt, and the org. phase was washed with sat. aq. Na_2CO_3 soln. The org. layer was dried ($MgSO_4$) and evaporated *in vacuo*. The residue was subjected to CC (AcOEt/MeOH 95:5) to afford the title compound in 82% yield. Clear yellow gum. $[\alpha]_D^{19} = 0.00$ ($c = 0.16$, MeOH). IR (NaCl): 3116, 2952, 1735, 1695, 1610, 1542, 1343, 1213, 1145, 737. ^{1}H-NMR (300 MHz, DMSO; rotamers): 8.82–8.81 (*m*, 1 H); 8.52–8.49 (*m*, 1 H); 8.10–9.90 (*m*, 1 H); 7.67–7.63 (*m*, 1 H); 7.31–7.17 (*m*, 6 H); 5.27 (*s*, 2 H); 4.75–4.65 (*m*, 1 H); 3.61 (*s*, 3 H); 3.05–2.49 (*m*, 7 H). ^{13}C-NMR (75 MHz, DMSO): 171.3; 156.1; 147.0; 144.5; 141.0; 137.1; 136.3; 135.0; 129.2; 128.4; 128.1; 121.2; 119.2; 117.1; 67.0; 54.7; 51.7; 37.3; 37.6; 31.5; 31.2; 30.8. HR-MS: 498.1644 ($[M+H]^+$, $C_{23}H_{24}N_5O_8^+$; calc. 498.1625).

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